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TITLE: "The Impact of Electronic Knowledge-Based Nursing Content and Decision-Support on Nursing-Sensitive Patient Outcomes"

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14. ABSTRACT Background: Advances in health information technology (HIT) and the use of evidence-based (EB), clinical decision support (CDS) tools in electronic health records (EHR) hold great promise. Researchers report that EHR technology may be an effective vehicle for providing EB information to clinicians, but little is known about how electronic innovations work to support nurses to know and use best practices to achieve optimal patient outcomes.

Objective: This study was designed to evaluate the impact of the Knowledge-Based Nursing (KBN) innovation, a customized design featuring actionable EB recommendations embedded into policy and the content and CDS tools in the EHR to support nurses to use best practices for six phenomena (pain, medication adherence, depression/suicide, fall risk, pressure ulcer risk/actual, and delirium) to improve patient outcomes. The study was guided by the Dissemination and Implementation of Evidence-based Policy Framework (adapted from Dodson, Brownson, & Weiss, 2012) to evaluate the impact of the innovation under usual deployment conditions and to see if unit-based implementation strategies could improve the effectiveness of the innovation over time.

Hypothesis 1: The KBN Innovation, deployed with passive dissemination, will have a positive effect on nursing knowledge, use of evidence-based practices, and the achievement of nurse-sensitive patient outcomes at baseline.

Hypothesis 2: "Active" implementation (audit/feedback of baseline results, education with behavioral expectations, leader-driven unit implementation and maintenance) by nurse leaders and designated staff will improve nurse knowledge and use of electronic and clinical practices and produce measurable improvements in outcomes compared to passive dissemination alone.

Methods: This pre/post mixed methods study was conducted with consenting medical/surgical and critical care nursing units (N=23) of a quaternary medical center where the KBN Innovation was deployed. The KBN Logic Model guided the development of nurse and patient surveys, audits/reports, and non-participant observation methods used to gather detailed information about unit context, nurse characteristics, nurse knowledge, care processes, patient perceptions, and outcomes for each unit. A multimodal implementation intervention was created to address knowledge and behavior gaps identified at baseline. The intervention included audit-based feedback and training (3.5 hrs) for staff and leaders to address knowledge gaps. Units identified their priorities and worked on unit-based implementation with varied maintenance strategies during the subsequent 6 month interval.

Results: The study yielded much data about staff nurses and nurse leaders and how they worked to deliver EB care to patients in the real world. At baseline (Q2, 2014), the electronic KBN CDS tools functioned as designed. The observations and audits revealed that staff utilized the KBN-based technology to support them to assess, diagnose, and deliver EB care. Gaps were identified in nurse/nurse leader knowledge scores (M=55.3% correct, SD 8.5%). Baseline leader observations revealed limited leader oversight of staff practice. Patients reported positive educational interactions with evidence of knowledge gain. The optimization feedback and training was delivered to leaders (N=48-100%) and staff nurses (849, 90%) with subsequent unit implementation. Units reviewed their baseline results and identified their outcome improvement priorities. Staff preceptors received grant-supported time to assist leaders to implement and maintain best practices for each unit (up to 64 hrs/unit) but they utilized usual practices (without the use of reports). In-depth analysis of the observations and audits are still in progress.

Conclusion: The conceptual framework was useful in guiding the analysis. Gaps in the knowledge and use of EBP behaviors were addressed by the implementation intervention with a high percentage of participation. Unit implementation was carried out using usual practices (without the use of reports and staff follow-up). Preliminary findings indicate that there was little improvement in the outcomes. Additional analysis remains in progress to identify details that may explain these findings.

NOTE: A Federal Military Advisory Committee is involved in all phases of the project to review and provide input/feedback on the study and identify ways to disseminate findings and applications for the military.

15. SUBJECT TERMS	Nothing listed				
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INTRODUCTION

This pre/post mixed methods research study is designed to evaluate the impact of Knowledge-based Nursing (KBN) – a technological innovation that features customized evidence-based content and clinical decision-support (CDS) tools in the electronic health record (EHR) specifically designed to support nurses to know and use evidence-based practices (EBP) in their patient care. The project is on track with the projected milestones and timeline for the primary study sight with expenses under the established budget.

This report provides a summary of our achievements over the past three years. We completed our baseline assessment (Q2, 2014) and identified that the technology functioned as designed but there were staff and leader knowledge and practice gaps that were believed to have an impact on the effectiveness of the tool. We collaborated with international experts in the field of dissemination and implementation (D & I) science to utilize a D & I conceptual framework to design a multimodal implementation intervention. The experts advised us to evaluation varied implementation strategies (A vs. B) since it is already known that dissemination - alone has little impact. We summarized the audit-based feedback and used it to create the training curriculum and materials aimed at the identified deficits. The training sessions (n=44) were attended by 100% of the nurse leaders and 90% of staff nurses (Sept/Oct, 2014). We provided units with audit-based feedback results and supported them to implement and use varied strategies to monitor/maintain the EBP over the months that followed. Post-intervention observations and survey assessments were completed during Q2, 2015. The Team continues to work on processing and thoroughly analyzing the findings from our primary site.
NOTE: The Team received approval to repurpose unused funds from Years 1 and 2 to replicate the study at two small non-urban, non-Magnet, community hospitals to enhance study generalizability. A no-cost 9 month extension was approved to support study replication and subsequent analysis.

This study represents an in-depth evaluation of an innovative strategy used to support nurses and nurse leaders to know and consistently use evidence-based practices in acute care. We gathered an extensive amount of information about the unit context, staff and nurse leader characteristics, nurse knowledge , observations and audits to evaluate the use and documentation of evidence-based practices and the impact on nursing sensitive outcome at a large urban Magnet-designated medical center where it was deployed. We are preparing several manuscripts detailing the study protocol, the theory, the methodology, and eventually the findings.

KEYWORDS [MESH]

- Decision Support Systems, Clinical
- Dissemination, Information.
- Evidence-Based Nursing
- Evidence-based Practice
- Health Services Research
- Nursing Evaluation Research
- Nursing Informatics
- Nursing Process Patient Care
- Organizational Context

- Outcome and Process Assessment (HealthCare)
- Patient Care Planning
- Performance metrics
- Research methodology

OVERALL PROJECT SUMMARY

Year 1 Summary: The KBN Impact Study Research Team started our work by reviewing the KBNI conceptual framework and Logic Model (Appendix A), and the KBN evidence summaries to identify essential components. We reviewed the literature to identify a suitable way to measure context and factors that influence the knowledge and use of evidence-based practices in patient care with appropriate measures (or create some if not available). The team selected an established tool, the Alberta Context Tool (Estabrook, Squires, Cummings, Birdsell, Norton, 2009) and the associated demographic and research utilization questions to support measurement and comparability. The team developed tools to assess nurse and nurse leader knowledge about the essential practices related to the six phenomena in focus for the study. We also created tools to assess the use of essential practices during patient care with non-participant observations and audits of the electronic record where the nurses documented the care they provided. Tools were also developed to audit documented patient education and to subsequently complete a guided interview ("patient survey") to gather patient perceptions and results of evidence-based patient education that they had received. We also collected descriptive information about the units and the nurse sensitive outcomes that were reported for each unit for the study period. The baseline findings were designed to evaluate the use of the technology and the essential practices under usual deployment conditions that were in place at the study institution. Usual deployment conditions consist of hands-on EHR functionality training (3-8 hour days) for go-live or with orientation if nurses were hired after go-live. Units have their own process for disseminating policies and KBN-based on-line training modules to their staff. The Research Team also validated that the essential content and CDS functionalities were working as designed in the EHR. The Team requested two enhancements to allow nurses to view risk factors and learning assessments during their care. The team refined the protocol for data collection and tested the tools and procedures in an alternate site prior to use for the study. The tools and study protocol were pre-reviewed by the TATRC Regulatory Compliance Specialist and received expedited review and approval by the Aurora Health Care (AHC) Institutional Review Board (IRB) (20-DEC-2013) and the Human Research Protection Office (HRPO) for the US Army Medical Research and Material Command (21-FEB-2014). In addition to the research study, the KBN Team collaborated with the TATRC Contracting Officer Representative - Ollie Gray to establish the Federal Military Advisory Group. The Advisory Group was led by LTC Michael Ludwig, RN-BC, MS, CPHIMS, AMEDD Chief Nursing Information Officer and included members of the Federal Nursing Informatics iEHR Collaborative. The group developed a charter and held ongoing meetings at key stages of the project.

Year 2 Summary: After receiving Aurora Institutional Review Board (IRB) and HRPO approvals, the KBN Research Team immediately informed and recruited nursing units (N=23) into the study. A power analysis indicated that group sample sizes of 337 observations would be needed for two sample t-test evaluation to achieve 90% power to detect a small difference (0.30)

with alpha set at 0.05. The team created a 4 month study calendar to schedule observation sessions (4-6 hour sessions for medical-surgical units and 9-6 hour sessions for ICU units) to observe approximately 16-19 patients per unit for optimal power. Observation and patient survey days were scheduled to occur when students were not scheduled to have clinical on the unit. The Patient Survey data collection calendar for medical/surgical units was prepared with 2 days per unit to enroll 5% (approximately 10 patients) per unit). The calendar was arranged to focus on a set group of units each month, collect all observations and patient interview within the same month. The baseline data were collected and analyzed. The findings identified that significant gaps in knowledge were present across all 6 of the phenomena. Leaders scored significantly higher than staff, but there were no differences in scores by unit or unit type. The Team used the essential practice summaries and baseline findings to create a list of behavioral expectations and the plan for delivering the implementation intervention. The Team prepared the curriculum and materials, completed continuing education credit paperwork, and set up the speaker/participant schedule and procedures for recruiting and delivering 44 - 3.5 hour training session to all nursing leaders (N=45) and staff (N= 849). In addition to knowledge-deficits, the observations revealed that nurse leader oversight and support for the use of the essential practices was limited – observed primarily during daily team meetings. The intervention was adjusted to provide funding to allow (2) staff nurses who were involved in orienting new staff (preceptors) to have grant-supported time to support implementation on the unit.

The PI increased her knowledge of dissemination and implementation (D&I) science by participating in the NIH Training D & I Training Institutes. The D&I experts advised the PI to be more explicit in describing the core components of the KBN innovation (Appendix B) and the importance of multimodal implementation strategies. Based on expert input, the PI and the team reviewed the "Dissemination and Implementation of Evidence-based Policy" framework (Dodson, Brownson, and Weiss, 2012) and adapted it (Appendix C) to capture the essential concepts important to the current study with the addition of dissemination and implementation process descriptions and intermediary outcomes (clinician knowledge and use of EBP) that appear to be an essential step toward achieving optimal patient outcomes.

Year 3 Summary: The Team provided informal follow up to support unit leaders and preceptors to focus on their priorities and to use usual processes (Strategy A) or electronic reports (Strategy B) to monitor and maintain adherence to the essential practices. The post-intervention assessment was carried out based on the protocol during Q2 2015. The remainder of the year has been spent downloading, cleaning, and analyzing the findings at the primary site using the conceptual frameworks to guide the interpretation.

The Team received approval for their proposal to repurpose unused funds to replicate the study at two community hospitals, sampling inpatient nursing units with diverse characteristics from the primary study site. Four additional units were recruited to the study (N=90 RN). Baseline data collection was completed in September with nonparticipant unit (N=51) and admission (N=10) observations, patient interviews (N=27) and nurse survey participants (N=50, 55%).

Personnel and Project Administration
Years 1-3:

- AHC completed a legal review and created a financial cost center for the project (FEB-2013)

- The Project Kick Off Meeting was held in MAR- 2013 with on-boarding of Research Team include Researchers (Hook, Gentile, & Singh) and Nursing Informatics Staff (obtained new research credentials and CITI Training); Nursing Informatics Specialist positions and hours were adjusted so staff were available to complete the nonparticipant observations efficiently.
- Recruited, hired and on-boarded two Clinical Nurse Specialist (CNS) advisors to support communication and subject recruitment – NOV 2013
- Recruited and on-boarded a nurse leader (site Chief Nurse Executive) to serve as the Patient Care Manager advisor to support Manager recruitment and participation (participates with no reimbursement since salaried with limited hours)– JAN-2014
- Job descriptions were created & posted for Project Manager (PM) & Graduate Intern; An interim PM (part time) helped to set up the project plan (PM vacant for 5 months)
- Interviewed, hired, and on-boarded Project Manager – JUN-2013 through JAN-2014; Position was vacant for 4 months until a replacement was hired (MAY-2014)
- Interviewed, hired, and on-boarded Graduate Intern – JUN- 2013; Intern was hired into a Researcher position when she finished her coursework DEC-2013 through AUG-2014. Interviewed, hired, and on-boarded a replacement research scientist (JUL-2014) and added another (OCT-2014) for observation data entry, chart audit/entry, data cleaning, and analysis.
- The study site "Magnet" Program Manager was added as a clinical advisor to support unit implementation and preceptor skills data collection – FEB-2015
- Submitted a revised Statement of Work (SOW) and Letter to the Contracting Officer Representative (COR) Tony Story, requesting to repurpose funds to replicate the study at two community hospitals to increase the sample diversity and broaden generalizability. (Approved JUL-2015).
- Research Scientist, (Badger) transferred AUG-2015; Research Scientist (Bauer) rehired 28-SEPT-2015.
- Kicked off the KBN Impact Study at two additional community hospitals and replicating KBN Impact Study Goals 4, 6, 7 & 8 with new sites - see details below (JULY-2015)
- In Progress Review (IRP) presented at Fort Detrick, MD (DEC-2015)

Consultants:

- The AHC Research Administration Contract Office set up formal contracts with two consultants (Devine and Dowding) named in the proposal
- The Study Team collaborated with Dr. Beth Devine to complete the essential knowledge review and begin to draft the knowledge test questions for nurse/nurse leaders (Consultant work completed with 4 additional hours of effort above budget) – Contract ended JAN-2014
- The Study Team collaborated with Dr. Dawn Dowding regarding study design. During Year 1, Dr. Dowding transitioned her faculty position from the University of Leeds (UK) to Columbia University (USA). Her initial contract was finalized for effort/consultation in Year 2. She reviewed the study protocol and measures and provided feedback. She conducted a site visit in MAY-2014. She received an orientation to the KBN Innovation and observed all facets of the baseline data collection that was in progress. She provided valuable feedback to the study team.
- The KBN Impact Study has many opportunities to share the work and findings from this study. To address this need, the PI recruited a scientific writing consultant (Chris McLaughlin) – APR-2014 to support the team to create a dissemination plan and to develop a team approach for abstract, poster, and manuscript preparation during Years 2 and 3.

- Researchers collaborated with the consultants periodically throughout 2015. Contracts were extended to utilize the remaining hours in 2016

GOAL #1: Identify essential knowledge and nursing practice behaviors (components)
STATUS: Completed Milestone in collaboration with Consultant - 29-JUN-2013

- The KBN Research Team reviewed and systematically analyzed the evidence-based practice synthesis documents to identify essential knowledge & practice behaviors for six phenomena: Acute Pain, Medication Non-adherence, Depressive Symptoms/Suicide, Risk for Falls/Fall-related Injury/Post Fall Management, Pressure Ulcer Risk/Actual, and Delirium Risk/Actual-all Venues (ICU and Med-Surgical)
- The KBN Research Team conducted iterative process meetings to identify the "essential" components - defined as those knowledge or behavior components that are necessary, indispensable, and foundational for staff and/or nurse leaders to carry out the patient care or meet the expected outcome/goal. A spreadsheet was create to support the analysis:
    - Recommendations from the synthesis regarding the assessments, diagnoses, interventions, and outcomes for each phenomena
    - Population specific requirements based on age or risk factors
    - Details about how component is entered into the EHR/functionality (e.g. content or clinical decision)
    - Details about where the component is documented (e.g. flow sheet/Patient Education/Care Plan/Medication Administration Record, etc.)
    - Details about how the researcher knows the component was completed
    - Details about how the researcher know if a CDS tool was used correctly
    - Details about which components are embedded into a policy or standard

GOAL #2: Validate that essential KBN electronic content/tools are incorporated in the electronic health record (EHR) and functioning as designed
STATUS: Completed Milestone w/addl build to support manual screening – 12–DEC-2013

- Utilized findings from Goal #1 as the basis for the gap identification conducted simultaneously during syntheses review of essential knowledge and nursing practice behaviors (preliminary list of gaps identified).
- Submitted specifications (17-Jun-2013) for building the "sidebar report" a print group report that provides nurses with viewable information about patient risk factors for use in matching interventions and patient education. Completed and tested.31-Aug-2013
- Submitted specifications for building manual mechanism for initiating additional screening tools even if they do not trigger based on patient assessment on admission – DEC 2013
- Submitted specifications for daily and monthly electronic report for capturing depressive symptom, cognitive and medication adherence screening on the Key Performance Indicator daily and Monthly reports. NOV-DEC 2013.

GOAL #3: Develop reliable and valid measures and measurement processes for evaluating the implementation and adoption of KBN-based practices
STATUS: Completed Milestone – DEC-2013;
Additional metrics were added (Modification #9) 15-FEB-2015

Measure Development (refer to details in Research Accomplishments)

- Nurse Survey - 4 part tool including the Alberta Context Tool, demographics, research utilization questions, and KBN Knowledge Test (41 questions evidence-based practices described in system nursing policy based on KBN)
- Nonparticipant Observation Tools during admission and ongoing patient care
- Audit Tool for evaluating associated documentation during admission and ongoing care
- Patient Survey including preliminary medical record review
- Process and Outcome Metrics: Process and outcome metrics were identified in the study protocol and will extracted from existing sources.
- Preceptor background characteristics were collected with time and activity tracking form (Appendix E).
- Preceptor knowledge and ability to use the monitoring tools appropriate to their study group (A – usual care vs. B – KPI Daily and other electronic reports) was evaluated during the month prior to post-implementation assessment. (Appendix E).

GOAL #4: Conduct baseline measurement to identify gaps (knowledge, practice behaviors, or EHR build) to improve the integrity of the planned KBN intervention study
STATUS: Completed Milestone – 30-JUN-2014

- AHC Biomedical Institutional Review Board (IRB) Study #13-142E approved the study with expedited review a with waiver of documentation of informed consent for nurse subjects, HIPAA authorization for retrospective medical record review, and requirement for maintaining a copy of the patient subject consent in the subject's medical record.
- DOD/USAMRMC Award #W81XWH-13-1-0034 protocol was submitted for review to the US Department of Defense Human Research Protection Office (HRPO) JAN- 2014
- Brigit Ciccarello, M.A., Regulatory Compliance Specialist, Telemedicine & Advanced Technology Research Center (TATRC) Research Program Officer advised proceeding with the administrative steps for unit/subject recruitment with initiation of data collection once HPRO approval was received.
- Recruitment meetings were kicked off with study site Nurse Leaders on 7-Jan-2013. A recruitment video was created to support a consistent message to all eligible units/nurses. Unit-level recruitment meetings were held with the use of a recruitment video. Unit recruitment was completed 28-FEB-2014 with all units (N=23) agreeing to participate.
- Baseline assessments were carried out between 11-MAR through 30-JUN-2014
    - *Nonparticipant Observations* (N=379 RN/Patient observations, 54 Nurse Leaders observations, and 40 RN/Patient admission observations)– Completed 27-May-2014
      Observations were conducted per protocol on all the study units (6 hour sessions)
      Med/Surgical Units = 4 observations/unit (approximately 25 patients/unit)
      Critical Care Units = 9 observations each (approximately 20 patients/unit)
      Admissions (n=2/unit) were observed (3 units did not complete admission observations because patient admission processes were completed by another unit).
      Nonparticipant Observations were gathered using (2) paper-based tools and transcribed into an electronic data collection tool based in SurveyMonkey ™ software.
      Data entry for nurse leader observations was completed 15-AUG-2014 and for non-participant observations by SEPT-2014
    - *Audits* (N=379 + 40 Admissions)

Near real time auditing was not possible because most staff worked 12 hour shifts with data entry extending beyond the end of the observation time. The audits were conducted retrospectively using the established process. Audits took much longer than to complete (approximately 45 minutes/observation) than initial estimate. Data entry for baseline audits was completed JAN-2015

- *Patient Survey* – Study Period MAR-2014 through MAY-2014
  Patients (n=185) were recruited and interviewed per protocol on the 18 non-ICU units during the study period. Chart audits and interview data were entered using an iPad into Survey Monkey. Data were downloaded into excel, cleaned, and analyzed..
- *Nurse Survey* - Study Period 27-May-2014 through 30-JUN-2014
  The Nurse Survey Tool was opened for data collection after unit observation were completed to minimize staff awareness of the practices that were being tested and observed for during the nonparticipant observations. The Nurse Survey was "kicked" off with the Nurse Leaders with fliers and email message sent to staff nurses employed on the study units and hospital float pool. The link to the Nurse Survey was delivered to eligible participants using the Learning Connection. The research team monitored participation and provided participation reports to the unit nurse leaders to support recruitment.
- *Process and Outcome Metrics*: Unit-based nurse sensitive outcome data were gathered from various sources including the EHR-based electronic reports (e.g. KPI Monthly report re: compliance with standards and documentation), hospital census (e.g. Patients/Patient Days, Length of Stay), and the National Database for Nursing Sensitive Indicators reports (e.g. Total/RN Hours per Patient Day, Falls/Injuries, Pressure Ulcers) and patient satisfaction (Hospital Consumer Assessment of Healthcare Providers and Systems/HCAPS) reports reported to external monitoring company used by the study institution. All units received a summary outcome report of measures pertinent to the study as part of the audit/feedback component of the intervention to support nurse leaders to identify priorities for implementation on the unit (Refer Appendix D – Baseline Findings for a sample). Further analysis of outcomes is in progress.

GOAL #5 Design the Intervention Study strategy including the delivery method
STATUS: Completed milestone – 30-AUG-2014

- Developed schedule and logistics for Optimization Training sessions to accommodate all 942 eligible staff nurses using electronic registration tracking system (Learning Connection). 30-JUNE-2014 (Note: The dates and rooms had to be set up in advance to allow nurse leaders to preplan classes and unit staffing and ensure room availability.)
- Findings from the Patient and Nurse Survey findings and Nurse Leaders Observations were analyzed and used to identify knowledge gaps - completed 15-AUG-2014
- Findings from the Nurse Leader Observations were analyzed used to identify behavior gaps. Given that nurse leaders had limited time and focus on Additional resources to support implementation, e.g., additional funding, preceptors, training, etc.
- Nurse Leaders were asked to identify priority outcomes and essential behaviors that they wanted to implement and maintain on their unit. Leaders were given (voluntary) access to additional study funding to provide indirect paid time for (2) staff nurse preceptors (informal opinion leaders) to monitor/maintain the use of best practices as directed by the leaders.

- PI participated in the 2014 Training Institute for Dissemination and Implementation Research in Health (TIDIRH) and networked with national/international experts to adapt the conceptual framework (Appendix A) and to confirm the best study intervention (audit/feedback, training with behavioral objectives, unit implementation, and maintenance) with a plan to randomize based on strategy for monitoring implementation. 25-JUL-2014
- Units were randomized into two groups (A & B) based on difference in strategy used to monitor implementation (usual care vs. electronic monitoring using reports) (Appendix E)
- Finalized format, learning objectives, methods, behavioral expectations, training materials and evaluation for the Nurse Leader and Staff Nurse Optimization Training course featuring an overview with four "break-out" sessions focusing on identified knowledge gaps including:
    - Navigator/Flowsheets/Care Planning
    - Mental Status (Delirium Risk/Actual)/Depressive Symptoms
    - Pain – Comfort/Function
    - Patient Education/Medication Nonadherence
- Developed (2) training videos to deliver study overview and audit/feedback results at baseline) and (6) brief videos to demonstrate key training content (e.g. mental status assessment (4), ADL assessment (1), and depression screening) 31-AUG-2014
- Created training materials for the training sessions:
    - Hand-outs: The 8-page handout included an overview describing the KBN core components and a list of the "essential practices" for implementation on the unit and worksheets for each session to practice the documentation during the case studies. (Duplicated and collated 950 sets) (Appendix E)
    - Reference Materials: 25 folders containing 15 printed reference sheets of content available in the EHR for participants to reference throughout the sessions.
    - Humorous incentive: "BINGO" game with template filled with key KBN words to enhance participant interaction. Winners received "I Won at KBN BINGO" button and were encouraged to wear them on their units to promote the training & encourage adoption.
- Completed the continuing education credit application including speaker biography and conflict of interest review and support/budget letter from USAMC sponsor. The course was awarded 3.67 contact hours from the Wisconsin Nurses Association.
- Developed a "Trainer Schedule" for KBN team and worked through Outlook to block schedules and to staff all of the training sessions.
- Worked with the Aurora Conference Center staff and online meeting space reservation systems at two locations in arrange audio visual requirements and room set up for all 44 training sessions at two sites.
- Collaborated with the Learning Connection staff to generate weekly lists of nurses enrolled in the training sessions and communicate unit-based registration data to monitor progress to the Nurse Leaders.

GOAL #6 Carry-out the intervention study at the ASLMC site
STATUS: Completed milestone – 02-DEC-2014

- Optimization Training was delivered for all Nurse Leaders (45 - 100%). 4-SEPT-2014
- Optimization Training for staff nurses started on 9-SEPT-2014. The initial plan was to utilize breakout sessions to promote small group discussion for enhanced learning. The first session revealed that small group discussion led to variations in content delivery with

challenges to time management. We altered the training plan immediately, reducing the number of instructors to 2-3 per session and promoting small group table discussions with the larger session rather than breaking out. Logistical adjustments were made to the "Trainer Schedule" and meeting room reservations to accommodate the change.

- Staff nurses were encouraged to use the Kronos clock at the training center to enter their hours directly into the Study cost center for optimal accuracy of their in-service time.
- Collaborated with the Learning Connection staff to update the tracking system with confirmed attendance for documentation and dissemination of contact hour certificates.
- A weekly attendance report was sent to Nurse Leaders so confirm attendance. The PM and the Post-Award Grant specialist worked closely with the nurse leaders to ensure accurate and timely reimbursement for staff nurse training participants.
- Optimization Training Session evaluations were summarized (Appendix E)
- Optimization Training was delivered for 90% (N=849) staff nurses 31-OCT-2014 with supplemental training sessions for unit preceptors by study group (A & B) to review the essential practices, their role, and how to use assigned monitoring strategy.

GOAL #7 Complete tracking process of the intervention
STATUS: Completed with Post Intervention Assessment 20-JULY-2015

- Meetings were held with unit leaders to review results with audit and feedback, to identify priorities and to discuss ways to do it on unit.
- Funds were provided to support unit leaders to engage their preceptor staff (2/unit) to implement the essential practices by identifying priorities and working to improve adopter skills by monitoring and providing feedback to maintain the practices on the unit.
- Created and distributed Preceptor Tracking Tool to document time and activities conducted to support unit implementation 30-NOV-2014
- Enlisted the study site "Magnet" Program Manager, who works with units on quality improvement activities, to ensure that the implementation activities aligned with established priorities and to support unit-based nurse leaders and preceptors to document their follow-up.
- Provided informal support and formal meetings with unit leaders and preceptors to implement and maintain essential practices.
- Initiated one-on-one unit follow up to evaluate Preceptor skills and facilitate Implementation activities, involving Clinical Advisor/Data Collector (Marzinski) 31-JAN-2015
- Researcher support of Unit Implementation activities concluded with the start of the post-implementation assessment 30-MARCH-2015
- Collected preceptor tracking tools to document time and activities conducted to support unit implementation with validation of time reported and time paid by grant.
- Compiled and completed data entry of preceptor tracking logs 15-SEPT-2015
- Collaborated with the study site Magnet Program Manager to compile Unit Implementation and outcome data 30-SEPT-2015

GOAL #8 Complete a full evaluation measuring the impacts of KBN methods on patient outcomes
STATUS: Post-implementation assessment is complete; Full evaluation in progress

- Reviewed baseline data collection forms and made minor adjustments identified as needed during data entry (IRB Modification #9)

- Created a master schedule for post-implementation assessment for 23 units at the study site. Student rotation and observer schedules were consulted and all team calendars were blocked. Adjusted schedule to accommodate regulatory visits.
- Produced data collection materials including unit information packets 15-MARCH-2015
- Clinical Advisors distributed packets and re-oriented units to the study 15-MARCH-2015
- Re-oriented data collection team with updated forms 17-MARCH-2015
- Oriented new Patient Survey data collector (Badger) 17-MARCH-2015
- Updated the Learning Connection module, the survey and recruitment materials for the Nurse Survey (approved by the IRB - Modification #10) 14-MAY-2015
- Met with site Clinical/Management Advisors to plan unit-level recruitment for the post-intervention Nurse Survey. Utilized same process for supporting staff nurse participation on work time with contributions to the unit Education Fund (45 minutes of average staff nurse salary for time spent).
- Provided active nurse survey recruitment support including weekly participation updates to Unit leaders
- Completed post-implementation assessment including:
    - Nonparticipant (N=360) and admissions observations (N=48) 5-JUNE-2015
    - Patient surveys (N=180) 5-JUNE-2015
    - Nurse Survey (N=467) 20-JULY-2015
        - Closed Learning Connection access and downloaded participant rosters
        - Finalized participation list by cross checking rosters with survey demographics to confirm participation and ensure grant reimbursement to units.
        - Communicated final counts and ensured transfer of appropriate funds to reimburse units for staff nurse and leader time spent taking the survey ($10,791).
- Completed post-implementation Nonparticipant, Admission and Nurse Leader Observation data entry with associated chart audits with auditor reorientation and reliability testing – 25-SEPT-2015
- Cleaned post implementation Nurse Survey data, submitted to biostatistician and completed pre-post analysis NOV-2015
- Cleaned post-implementation Patient Survey data, submitted to biostatistician and began pre-post analysis DEC-2015
- Identified unit priority outcomes, completed data entry and cleaning of Unit implementation and outcome data, submitted to biostatistician and began pre-post analysis JAN-2016
- Cleaned post-implementation Nonparticipant, Admission and Nurse Leader Observation data submitted to biostatistician and began pre-post analysis FEB-2016
- Completed detailed analysis plan through ongoing meetings with biostatistician

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No Cost Extension – Replication of Study at two community hospitals
Four additional inpatient units from Aurora Memorial Hospital at Burlington (AMHB) and Aurora Lakeland Medical Center (ALMC) were successfully recruited to participate in the study.

Replication Goals #1-3
Not Applicable

Replication Goal #4: Conducting baseline measurements to identify gaps
STATUS: Completed Milestone 14-OCT-2015

- Met with Chief Nurse Aurora Lakeland Medical Center (ALMC) and Aurora Memorial Hospital Burlington (AMHB) to confirm interest/support (with letter for IRB) 15-MAY-2015
- Revised the protocol submitted it to the Aurora IRB as a modification with supporting documentation. Obtained IRB approval 28-MAY-2015
- Submitted letter to the Department of Defense Contracting Officer Representative (COR) with revised the Statement of Work (SOW) (available by request) to propose a no-cost 9-month extension to replicate the study at two smaller sites to increase generalizability. 8-JUNE-2015
- Updated KBN Study recruitment video for new sites (with IRB approval) JUNE-2015
- Met with Chief Nurse and Unit Leaders to plan recruitment 25-JUNE-2015
- Recruited and enrolled 4 inpatient nursing units into the Study based on study protocol (30-JULY-2015)
- Created a master schedule for baseline assessment for 4 units at the new study sites. Student rotation and observer schedules were consulted and all team calendars were blocked.
- Communicated with observation schedule to units
- Met with and oriented Clinical advisors at the new study sites
- Created and distributed orientation packets to prepare for the baseline assessment
- Produced all observation forms and posters
- Secured space including printer, phone and storage at the new study sites.
- Prepared Nurse Survey materials for survey monkey and Learning connection.
- Completed Baseline Assessment including:
    - Nonparticipant (N=51) and admission observations (N=10) 25-SEPT-2015
    - Patient surveys (N=27) 23-SEPT-2015
    - Nurse Survey (N=51) 14-OCT-2015
- Collaborated with leaders to ensure accurate reimbursement for Nurse Survey hours

Replication Goal #5: Design the Intervention Study strategy including the delivery method
Not Applicable

Replication Goal #6: Update based on gaps Deliver the intervention (Optimization Training) at new sites
STATUS: Completed milestone 20-NOV-2015

- Cleaned nurse survey data, analyzed results and identified gaps in knowledge.
- Updated audit/feedback results video based on the baseline assessment
- Updated training module content to address gaps in knowledge identified in the baseline assessment.
- Planned and conducted Optimization Training 2-NOV-2015 to 20-NOV-2015
    - Collaborated with Nurse Leaders regarding logistics for Optimization Training
    - Drafted Staff Nurse and Nurse Leader Optimization Training schedule to accommodate Unit participation, Reserved meeting space

- Submitted Continuing Education application with approval
- Worked with Learning Connection to create courses
- Reviewed and prepared updates for the training hand out materials based on baseline findings
- Created all training hand out materials
- Monitored registration progress, provided weekly updates to Leaders
- Completed training sessions for leaders (1 session), (N=9, 100%) and staff (13 sessions), (N=72, 76%)
- Reconciled rosters with attendance for each session and communicated with leaders
- Provided active oversight of staff to ensure accurate Kronos transfers
- Completed evaluation summary for WNA continuing education credits

Replication Goal #7: Complete Tracking Progress at new sites
STATUS: In progress (Scheduled to be completed by 25-APRIL-2016)

- Conducted webinar with Nurse Leaders to review site-based results and the use of electronic reports to implement and maintain essential evidence-based practices 13-NOV-2016
- Communicated behavioral expectations for unit implementation, e.g., identify goals, preceptors and timing for additional training and support
- Met with unit leaders to further review baseline results and to identify unit priorities for implementation 9-DEC-2015
- Scheduled, planned and conducted two CNS/Preceptor "super' training session to discuss roles and strategies to monitor unit implementation and ensure follow up and maintenance 10-DEC-2015
- Communicated weekly with CNSs, Leaders and Preceptor throughout January and February to provide targeted coaching and support both in person and via conference call as needed to ensure implementation strategies are being deployed.

Replication Goal #8: Complete Full Evaluation (Post-Implementation Assessment and Final Report)
STATUS: Pending

- Completed baseline nonparticipant and admission observation data entry and chart audits
- Cleaned baseline patient survey data
- Initiated unit and site-specific nursing sensitive process and outcome data collection
- Created a master schedule for post implementation assessment (APRIL-MAY-2016) for 4 units at the new study sites. Student rotation and observer schedules were consulted and all team calendars were blocked.

TRAVEL AND CONFERENCE ATTENDANCE

Year 1:

- PI attended 2013 Midwest Nursing Research Society Conference-Chicago to recruit intern (MAR-2013) and participate in preconference session on Implementation Research- NOT funded by Grant
- PI and Graduate Student Intern attended the Annual AMIA Informatics Conference (NOV-2013) in Washington DC to network and participate in a preconference workshop on patient engagement
- Federal Military Advisory and/or TATRC Review – Presentations not requested - Travel was deferred.

Year 2:

- Clinical Decision Support (CDS) consultant traveled to Milwaukee (May-2014) to meet with the team and observe the research methodologies in progress.
- PI collaborated with Graduate Student Intern and Consultant to submit an abstract for the Annual AMIA (Informatics) Conference in Washington DC for an interactive presentation on Patient Engagement in Acute Care - it was not selected for presentation. PI submitted details about KBN Impact Study with sponsor information for a report presented at the AMIA Nursing Informatics Working Group (NIWG) Fall Symposia Event (Sunday 16-NOV-2014); PI attended annual AMIA conference to network and attend sessions.
- Federal Military Advisory and/or TATRC Review – Presentations not requested - Travel was deferred.

Year 3:

- PI and Research Scientist attended the Midwest Nursing Research Society (MNRS) 2015 Annual Research Conference - 17-APRIL-2015 – Indianapolis, IN for poster presentation
- PI and Research Team Members traveled to the 2015 Epic User Group Meeting (UGM) – 2-SEPT-2015 – Verona, WI for two podium presentations
- PI and PM traveled to Ft. Detrick, MD for the In Person Review (1-DEC-2015) to present progress of the study

KEY RESEARCH ACCOMPLISHMENTS

1) Institutional Review Board and Human Research Protections Office Review

Protocol Title: "The Impact of Electronic Knowledge-Based Nursing Content and Decision-Support on Nursing-Sensitive Patient Outcomes"

Approvals/Continuing Reviews to Data:

- Aurora IRB Approval #13-142E 20-Dec-2013: Updated with Waivers 03-JAN-2014
- Aurora IRB Continuing Review of Expedited Study (Exp Cat 5 & 7): Approved 24-NOV-2014 and 11/24/15
- Human Research Protections Office (HRPO) Approval Log No. A-17696 EDMS #5648 21-Feb-2014; Approved Continuing Review documents with updated protocol acknowledged 19-DEC-2014 and 23-NOV-2015

Study Protocol Modifications:

- AHC IRB Modification #1 –Ketchum added (completed CITI Training & Orientation) – Approved 08-JAN-2014
- AHC IRB Modification #2 – Removing Hartwig/Mills, updating *Patient Survey question with review of Unit Recruitment Video – Approved 31-JAN-2014
- AHC IRB Modification #3 – Review of *observation/audit forms - approved 03-FEB-2014 *Note – Final/AHC IRB approved versions of the Patient Survey and Nonparticipant and Audit forms were forwarded to HRPO prior to final approval
- AHC IRB Modification #4 - Updated HRPO address with Patient Consent edits requested by HRPO – Approved 28-FEB-2014
- Study Protocol and AHC IRB approved documents with HRPO edits were reviewed by Patricia Shank, CTR for US ARMY MEDCOM for review
- Study Protocol submitted to HRPO - Dr. Laura R. Brosch, RN, PhD, Director of the Human Research Protection Office (HRPO) Office Approved 21-FEB-2014
- Aurora IRB acknowledged received of HRPO Approval Letter– 24-FEB-2014
- AHC IRB Modification #5 with final Nurse Survey with Learning Connection ppt to introduce survey - Approved 25-MAR-2014
- AHC IRB Modification #6 to add Interim RN Data Collector (completed CITI Training and Orientation) with updated PI Address (moved to new location)– Approved 10-APR-2014
- AHC IRB Modification #7 to add Project Manager (Nikolic) and Research Scientist (Badger) (completed CITI Training/Orientation) with revised fliers for Nurse Survey recruitment – Approved 03-JUN-2014
- AHC IRB Modification #8 with updated IRB Document and Study Protocol (Version #3 – 06-NOV-2014) with updated conceptual framework and details about randomization plan, optimization training, and unit implementation. The Nurse Information Letter and Patient Consent forms were updated with PI address change. Added Research Scientist (Martens) (completed CITI Training/Orientation) to replace Bauer (resigned) Approved 20-NOV-2014
- AHC IRB Modification #9 with updated Study Protocol (Version #4 – 09-FEB-2015) with editorial changes to enhance background and process description, updated observations and audit forms to capture data that were written in during baseline assessments, updated fliers and other study materials with revised PI contact information, updates to the Nurse Survey Learning Connection module in preparation for use during post-intervention assessment. Updated role for research scientist (Badger) to include recruitment, consent, and data collection of Patient Survey (in place of Bauer) and added clinical advisor (Marzinski – Site Magnet Coordinator) for limited hours to support tracking of unit-based implementation including preceptor staff use of maintenance tools and tracking form. Approved 15-Feb-2015
- AHC IRB Modification #10 with updated flier and email to introduce the Nurse Survey Approved 14-May-2015
- AHC IRB Modification #11 with updated Study Protocol (version #5 – 28-MAY-2015) proposing the addition of two small community sites to increase the diversity of our sample and broaden generalizability. Proposed to add four additional inpatient nursing units, 90 nurses and 80 patients. Also updated recruitment video script and Nurse Information Letter to include information about the two new sites. Approved 28-MAY-2015
- AHC IRB Modification #12 with Personnel Changes (Resignation Badger/Rehire Bauer) submitted 9-OCT-2015

2) Updated Theoretical Framework and Intervention Plan for the Study

The KBN Team reviewed the literature and selected the Dissemination of Evidence-Based Policy framework (Appendix B) by Dodson, Brownson, and Weiss (2012, p. 440) to explain how context and dissemination and implementation strategies influence the adoption and use of the KBN innovation. Although the model is conceptualized for public health, the concepts appeared to be relevant to the evidence-based policy process used in acute care. Dodson and colleagues (2012) describe three key domains to implement evidence-based practice: policy content, policy process, and policy outcomes. "Policy content" focuses on identifying the specific evidence based policy elements that are likely to be effective. "Policy outcomes" refers to the overall effect of policy implementation. "Policy process" refers to the many factors including the structure and scope of the process, the presence and standing of the policy "sparkplug" (facilitator) and their ability/skills to articulate, advocate, and communicate support for the policy. Leaders can choose a "dissemination" (passive) approach to increase target audience "awareness". They can also choose an "implementation" (active) approach with active strategies that facilitate the adoption, implementation, and maintenance processes. "Adoption" is defined as "a decision to make full use of an innovation as the best course of action available" and to take steps to identify and address barriers to adoption. "Implementation" refers to 'the extent to which an innovation is carried out with completeness and fidelity" with a focus on improving the skills of the adopters through training and technical assistance. "Maintenance" refers to the extent to which an innovation becomes embedded into the normal operation and maintained by policy enforcement (p. 440).

The PI participated in National Institutes of Health (NIH) Training Institute for Dissemination and Implementation Science (TIDIRH) (Refer to Additional Achievements). The institute provided education and guidance for adapting the Dobson et al., (2012) conceptual framework for use with nurses in acute care. We received advice on how to redesign the implementation intervention. The international experts (including Dr. Ross Brownson – an author of the Dodson et al. model and Dr. Sharon Straus) supported the conceptual framework adaptation and advised us to be more specific about the core components of the KBN Innovation (Appendix B) and to utilize a multifaceted implementation strategy. They also encouraged us to use a head to head comparison of maintenance strategies rather than using a "control" group with dissemination since dissemination by itself is not effective.

The adapted theory (Appendix C) supports the evaluation of both hypotheses in this study with the addition of two intermediary outcomes: EBP knowledge and use of EBP behaviors as an essential step to achieve optimal outcomes. These intermediary outcomes are not commonly evaluated in EBP/knowledge translation implementation research (Yost, Ganann, Thompson, Aloweni, Newman, et al., 2015), but measurement of these factors may provide important information to help us to understand why EBP uptake is limited. Dissemination refers to passive knowledge transfer. Implementation refers to a more active approach influenced by the unit environment and the degree to which EBP is adopted, implemented and maintained. The adapted model describes the importance of "adoption", having clear behavioral expectations, assessing/ improving adopter skills and the use of maintenance strategies to ensure use. Dodson and colleagues also indirectly referred to the use of a "sparkplug" (facilitator) to achieve and maintain/enforce use of the evidence-based process but offered no specific details about this role in the model. Our baseline findings suggested that nurses leaders were not often observed giving

feedback to staff regarding the phenomena in focus for this study. All of the study sites utilize staff nurses who intermittently serve in the role of "preceptor" with responsibilities for role modeling, educating, and socializing new staff. We asked nurse leaders to identified (2) preceptors to support them to implement evidence-based practices on their unit.

The study intervention was revised to be conceptually consistent with the theory, delivering a multi-modal implementation strategy to support unit-based implementation and maintenance. Implementation refers to the "process of putting to use or integrating evidence-based interventions within a setting" (Rabin, Brownson, Haire-Josu, Kreuter, Weaver, 2008, p. 118). Researchers have reported that multifaceted implementation strategies are more effective in supporting nurses to use evidence-based practices during patient care (Ista, van Dijk, van Achterberg, 2013; Ivers, Jamtvedt, Flottorp, et al., 2012, Matthew-Maich, Ploeg, Dobbins, Jack,2013; Wuchner, 2014).

Commonly used implementation strategies include (1) embedding the practices into organizational structures such as policies and documentation (Matthew-Maich, et al., 2013), (2) audit/feedback, (3) educational meetings with clear behavioral expectations, and (4) leadership strategies to improve and maintain adopter skills over time (Wuchner, 2014). Audit and feedback, defined as "a summary of clinical performance over a specified period of time", is used to prompt professionals to modify their practice behavior to be consistent with established standards (Ivers, et al., 2012), In a systematic review, audit and feedback as an implementation strategy was associated with small (4.3%) but potentially important improvements in practice, and was most effective when baseline performance is low, when given by a supervisor or colleague, provided more than once, delivered in verbal and written formats, and with explicit targets for improvement (Ivers et al,, 2012). Educational strategies had a small effect (Cheater, Baker, Reddish, Spiers, Wailoo, et al., 2006) at 6 months but most studies report that educational strategies by themselves were not insufficient to achieve outcomes (Ista, et al., 2013; Thompson, Estabrooks, Scott-Findlay, Moore, Wallin, , 2007; Wuchner, 2014).

3) Current State Literature: EBP Use by Nurses with Role of Nurse leader

Researchers have historically reported that limited resources, knowledge, skills, and time posed barriers to the use of EBP by nurses in hospitals (Hannes, et al., 2007; Pravikoff, et al., 2005). In their recent integrative review, Sanders & Vehvilainen-Julkunen (2016) found that the vast majority (81%) of research studies on nurse readiness for EBP were descriptive cross-sectional surveys evaluating attitude and self-reported knowledge, skills, and use of EBP. They concluded that more robust, theoretically-based, and psychometrically sound nursing studies were needed to test and evaluate the effectiveness of interventions to advance the EBP competencies of nurses.

Researchers continue to report that the use of EBP in clinical settings by RNs remains low (Duffy, Culp, Yarberry, Stroupe, Sand-Jecklin, et al., 2015; Melnyk et al., 2012; Yoder et al., 2014). Most recently, Melnyk and colleagues (2016) reported the findings of a national survey asking chief nurse executives (CNEs) about EBP and outcomes at their facilities. Many hospitals reported low scores on key nurse sensitive performance indicators. Many of the CNEs reported high value for EBP, but reported low EBP implementation by nurse leaders and point-of-care clinicians. Safety and quality were high priorities. EBP was a low priority with limited

budget allocation. Warren and colleagues (2016) also reported leader barriers to the integration of EBP that was associated with leader turnover and competing priorities. Melynk (2016) made an urgent plea for nursing organizations to provide top-level support, role modeling, and monetary investment to implement EBP and drive improved outcomes. Engaging leaders (and informal opinion leaders) has been shown to have a positive effect on EBP knowledge, attitudes, and behaviors within the community (Flodgren, Parmelli, Doumit, et al.,2011; Gifford, Davies, Graham, Tourangeau, Woodend, , et al., 2013; Huis, et al., 2013; Park, Zafran, Steward, et al 2014; Stetler, Ritchie, Rycroft-Malone, Charns, 2014; Valente & Pumpuang, 2007 ;Yost, et al., 2015). Stetler and colleagues (2014) described that leaders must be engaged in functional, strategic, and cross-cutting behaviors, including deliberately and routinely talking about and demonstrating desired EBP behaviors. Gifford and colleagues (2013) reported that current nurse leader practice did not routinely involve monitoring adherence to guideline-based care but this may be an effective strategy to be present, communicate, and reinforce responsibilities. Tools may be needed to help leaders to monitor and know if/when best practices were used in daily practice (Gifford, et al, 2013; Ista, et al., 2013; Matthew-Maich, et al., 2013).

Limitations

This study represents a comprehensive assessment of the context, processes, and outcomes associated with the use of a technological innovation designed to support nurses to know and use best practices in patient care. This study was conducted using all inpatient nursing units within a single health care system. This study is designed to be conducted within a single organization because the customized build is not available at any other facilities. This single-site design limits generalizability, but is not unusual. Buntin and colleagues (2011) analyzed HIT research and found that more than half (64%) of the studies in their review were conducted in a single institution or tightly integrated network. Replication of this study at two additional facilities that vary in size, leadership structure, and Magnet status will add diversity to the sample and enhance the overall generalizability.

CONCLUSION:

The "KBN Impact Study" represents a robust, theory-based study evaluating the impact of technology on nursing knowledge, behaviors and patient outcomes at three diverse study sites. The study is proceeding toward goal accomplishment according to plan and under budget. The Research Team has reviewed the literature and networked with international leaders in dissemination and implementation research to build a strong theoretical foundation for the study. The study site was solidly engaged in participating in the study as evidenced by 100% of inpatient units recruited for the study, high (49%) voluntary response rate to the Nurse Survey, and high (100% Leader and 90% of Staff Nurse) participation rate in the Optimization Training. We have created useful tools and gathered an extensive amount of real-world qualitative and quantitative data with analysis and hypotheses testing in progress. We are also utilizing unused funding to replicate the study (no-cost extension of this grant) in a smaller, community site to increase generalizability of the findings. We look forward to completing the post-intervention assessment and sharing results of this important work over this our final year.

PUBLICATIONS, ABSTRACTS, AND PRESENTATIONS

Publications – Manuscripts in progress

- KBN Impact Study Protocol Paper for journal: Implementation Science
- Theory Paper re: the adapted Conceptual Framework for the Dissemination and Implementation of Evidence-based Policy
  Journal: Journal of Advanced Nursing
- Methodology Paper re: Mixed Methods Study for Baseline
  Journal: Computers, Informatics, Nursing (CIN)

Abstracts (not accepted/pending)

- Abstract submitted to AMIA Conference (MAR-2014) for Fall 2014. Preliminary findings were in progress so we did not have data to qualify as a research submission. The Research Team collaborated with Dr. Dowding (consultant) and another colleague to submit a proposal for an interactive panel presentation on Patient Engagement in Acute Care.
  Results: Not accepted
- Abstract submitted to AMIA Conference (MAR-2015) for fall 2015
  Title: "The Impact of Electronic Knowledge-Based Nursing (KBN) Content and Decision-Support on Nursing Knowledge and Use of Evidence-based Practices"
  Authors: Hook, Badger, Gentile, Giannini, Hoffmann, Ketchum & Martens
  Results: Not Accepted

Presentations:

- **Poster Presentation:** "Measuring the Impact of Evidence-based Patient Education on Patient Knowledge and Behavior in Acute Care" Authors: Bauer & Hook at the 16th Annual Southeast WI Building Bridges Research Conference - 09-MAY-2014 – Milwaukee, WI
- **Poster Presentation:** "Evaluating the Impact of Evidence-Based Patient Education on Patient Knowledge and Behavior in Acute Care" Authors: Bauer & Hook at the Annual Aurora Scientific Day Conference – 21-MAY-2014 - Milwaukee, WI
- **Poster Presentation:** "Using Implementation Theory to Evaluate the Impact of Technology to Support Evidence-Based Nursing Practices in Patient Outcomes in Acute Care." Authors: Hook & Badger at the Midwest Nursing Research Society (MNRS) 2015 Annual Research Conference - 17-APRIL-2015 – Indianapolis, IN
- **Podium Presentation:** "Using Implementation Theory to Evaluate the Impact of Technology to Support Evidence-Based Nursing Practices in Patient Outcomes in Acute Care." Authors: Hook at the 17th Annual Southeast WI Building Bridges Research Conference - 8-MAY-2015 – Milwaukee, WI
- **Poster Presentation:** "The Impact of Electronic Knowledge-Based Nursing (KBN) Content and Decision-Support on Nursing Knowledge and Use of Evidence-based Practices", Authors: Hook & Badger at the Annual Aurora Scientific Day Conference – 20-MAY-2015, Milwaukee, WI
- **Podium Presentation:** "Using Implementation Theory to Study How Technology Supports Best Practice." Authors: Hook, Giannini, Ketchum, Hoffmann at the 2015 Epic User Group Meeting (UGM) – 2-SEPT-2015 – Verona, WI

- **Podium Presentation:** "Investigating Adherence to Evidence-Based Practice at the Bedside" Authors: Hook, Giannini, Ketchum, Hoffmann at the 2015 Epic User Group Meeting (UGM) – 2-SEPT-2015 – Verona, WI
- **Podium Presentation:** "Using a Mixed Methods Design to Investigate Adherence to Evidence-Based Nursing Practices in Acute Care" Authors: Hook at the MNRS 40th Annual Research Conference – 18-March-2016 – Milwaukee WI
- **Keynote Address:** "Nursing at a Crossroad: Is Evidence-Based Practice Core . . . or NOT?" Authors: Hook at the 18th Annual Southeast WI Building Bridges Research Conference – 13-MAY-2016 – Milwaukee, WI

INVENTIONS, PATENTS AND LICENSES – None

REPORTABLE OUTCOMES: (In progress)

- Specifications of the standardized content, CDS tools, electronic care plans, and report tools in the EHR are available for use in scaling the project for the future
- Team is collaborating with Epic (vendor) and members of the Epic Nursing Collaborative efforts to standardize the content and care planning tools for key nursing phenomena.
- Adapted conceptual framework (Dodson, et al., 2012) used for the study with input from international experts in Dissemination and Implementation Research. A manuscript to publish the KBN Impact Study protocol with the adapted framework, core concepts, and specifications for comparing two implementation interventions is in progress for submission to the journal *Implementation Science*.
- Methodology paper describing the key aspects of this mixed methods study is in progress
- Lesson Plans for training staff nurses, nurse leaders, and preceptors regarding the essential evidence-based practices can be used to scale project for the future.
- Lesson Plans and tracking tools for training preceptors can used to scale project for the future

OTHER ACHIEVEMENTS

2014 Training Institute for Dissemination and Implementation Research in Health

The Principal Investigator submitted an application for the 2014 Training Institute for Dissemination and Implementation Research in Health (TIDIRH; July 20-25, 2014) - an intensive 5 day training seminar to support researchers in designing and conducting dissemination and intervention (D & I) research. Meissner and colleagues (2013) authored a paper about the emerging science of D & I with details about the n. The 2014 training institute (4th cohort) was sponsored by Harvard University and the Dana-Farber Cancer Institute with support from the National Institutes of Health, and the U.S. Department of Veterans Affairs. Dr. Hook was one of 41 participants selected from a pool of 289 international applicants who met the credentialing criteria and proposed a feasible D & I project to work on. The KBN Impact Study protocol and intervention plan was reviewed by national and international experts who confirmed the appropriateness of the conceptual framework adaptation (Appendix C) and the Intervention Plan (Appendix E) with audit/feedback, training, unit implementation) and varied maintenance. The faculty also offered support to the PI for publication of the study protocol and theory paper that were developed as a result of the consultation.

Federal Military Study Advisory Council Collaboration

Year 1:

- Established a collaborative relationship with LTC Michael Ludwig, RN-BC, MS, CPHIMS, AMEDD Chief Nursing Information Officer, Ollie B. Gray RN, MSN, PMP Executive Healthcare Manager, AITG for TATRC and members of the Federal Nursing Informatics iEHR Collaborative
- Orientation meeting (conf call) held with LTC Ludwig and associates – MAR-2013
- LTC Michael Ludwig set-up kick-off /orientation meeting with DOD Nursing Information iEHR Collaborative Meeting – 28-MAY-2013
- Worked with LTC Michael Ludwig to plan subsequent meetings (July 31 2013) with plan to draft a Council Charter
- F/u call (30-AUG- 2013) with Federal Military Advisory Committee. Each branch has their own path/approaches to evidence based practice. Discussed need for determining how similar or different military facilities are from study site.
- The Assessment form was developed and distributed to assess processes used by each branch to support evidence-based practice during the SEPT-2013 meeting.
- Navy Branch Meeting held on 23-OCT-2013, led by Captain Joel Parker to discuss the KBN research project to attendees and request input from Navy Nurses. The Navy representatives discussed where they were in building their documentation system with best practices and associated protocols, etc. for cross military/cross discipline use. Consensus was achieved around the need for strategies to ensure adoption and evaluation re: informatics build to ensure that it was working and supporting the staff to effectively achieve outcomes. The call ended with shared interest but uncertainty regarding next steps.
- December check-in conference call was held 13-DEC- 2013 with Federal Advisory Council. To date, however, none of the branch stakeholders completed the Assessment Tool for gathering information about the nursing structure and where they are with doing evidence-based practice projects supported by informatics. (Assessment deferred)

Year 2

- The KBN Research Team continued a collaborative relationship with our Federal Military Advisory Council led by LTC Michael Ludwig, RN-BC, MS, CPHIMS, Officer in Charge to the Presidential Medical Evaluation Treatment Unit - OIC METU and the members of the Federal Nursing Informatics iEHR Collaborative.
- Conference Calls were held quarterly to update the group regarding study progress including
  24-JAN-2014 to describe recruitment
  7-APR-2014 to describe baseline data collection
  15-AUG-2014 to describe baseline results and intervention plan

The group discussed the ways in which this research can provide relevant information regarding issues that are facing the participating agencies. LTC Seeley suggested study could be presented at the 2015 Defense Health Information Technology Symposium.

Year 3

- The collaboration with the Federal Military Advisory Council continued in 2015
- Advisory group formal conference call took place on 20-APRIL-2015. PI presented details about the active intervention and plans for reassessment

- The military advisory group discussed the status of the military's efforts to select a new EHR
- Advisory members were still unclear about the link between the study and their work.
- A planning call took place with LTC Ludwig 18-NOV-2015. He reported his role had changed and was unclear regarding the link between the study and the work, suggested that we seek advice from our COR.

In year 4, researchers will communicate with Federal Advisory Board members to look for opportunities to present findings.

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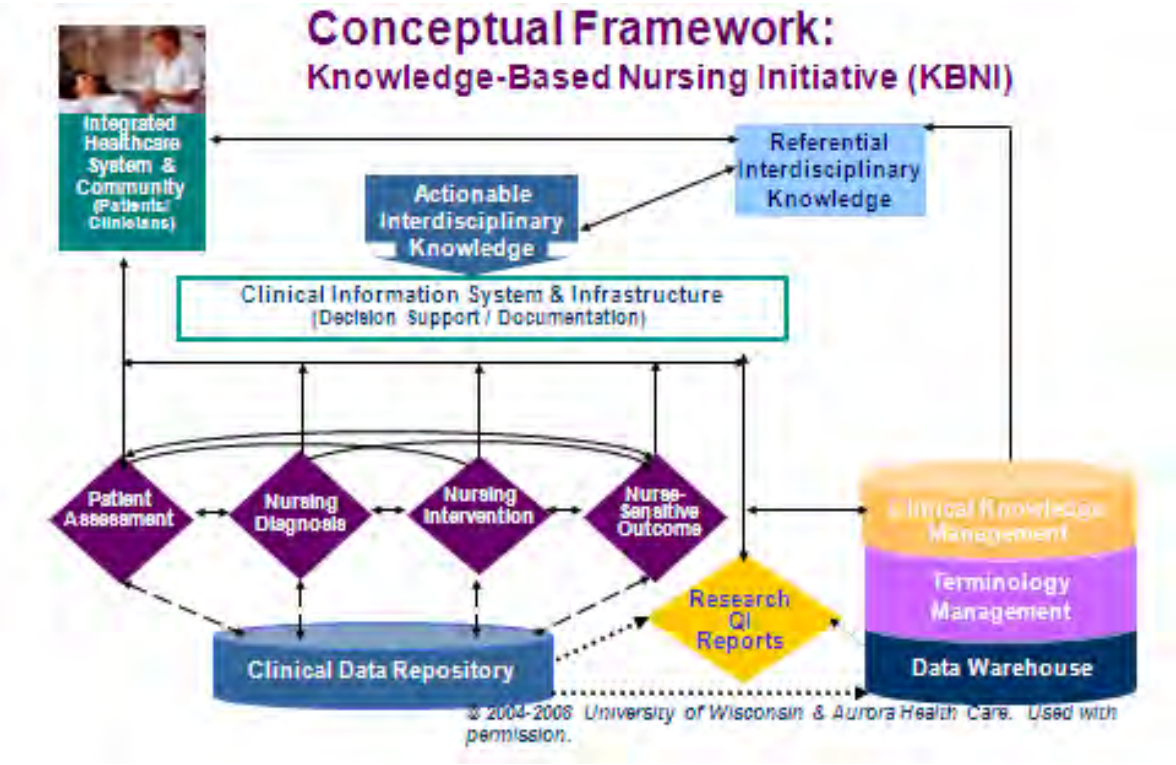
APPENDIX A. KBNI Conceptual Framework, Logic and Patient Engagement Models (Unchanged)

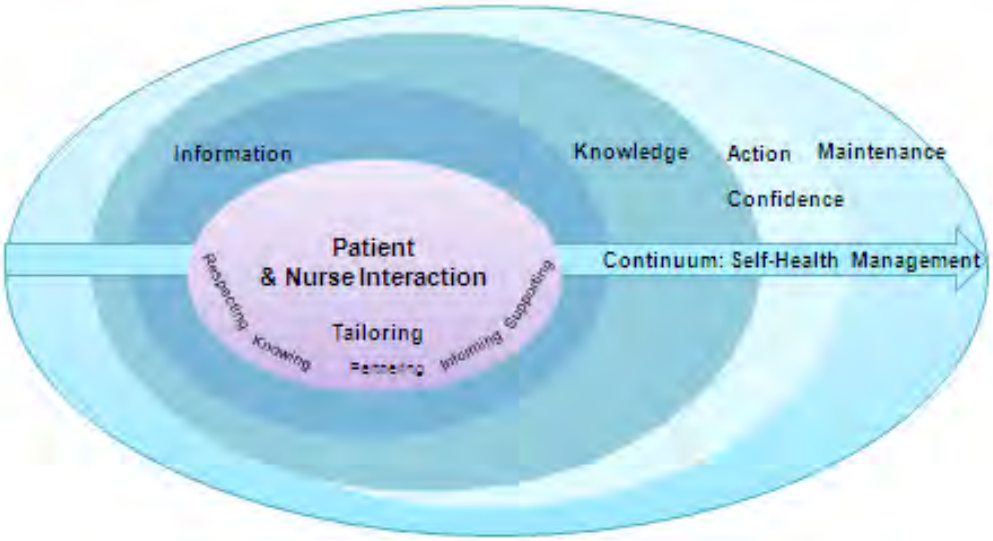


Knowledge-Based Nursing (KBN) Program Logic Model

Inputs	Outputs		Outcomes		
Tools	Activities	Participants	Implementation	Adoption	Outcomes
KBN Conceptual Framework	Aurora System Nursing Culture	Nurse Executives*	Nurse Leader KBN /EBP Knowledge	Nurse Leader Adoption Behavior	Mortality
KBN Syntheses	KBN Built into Policy	Patient Care Managers*	Staff RN KBN/EBP Knowledge	Frontline Staff Adoption Behaviors	Length of Stay
Standardized, nurse-sensitive EHR elements	Shared Governance (System)	Clinical Nurse Specialists	Accurate Risk/Event Screening	Early Detection of Complications	30 Day Readmission
Electronic Functions for Care Planning	Nursing Unit-Level Environment*	RN (Frontline) Staff	Accurate Problem Identification	Care Plan Interaction	Nurse Sensitive Adverse Outcomes *
Clinical Decision Support (CDS) Tools	KBN-specific Training	Providers	KBN-based Technology Used Effectively	Technology Acceptance (Ease/Usefulness)	Nurse-Sensitive Outcomes (Beyond Adverse Events)
Patient Level Evaluation Tools	Unit-Level Adoption Support	Patients	KBN-based Collaboration Knowledge	KBN-based Collaboration Behavior	Provider Satisfaction with Collaboration
Aggregate Level Evaluation Tools				Patients Receive Evidence-based Message	Patient Reported Use of Recommendations
			Nursing-Sensitive Parameters - (Not specifically influenced by KBN Evidence		
*Externally Reported Nursing-Sensitive Measures Fall Events/ Fall-related Injuries & Hospital Acquired Pressure Ulcers			Patient Acuity / Turnover*	RN Satisfaction*	Patient Satisfaction
			Staffing* (Nursing Care Hours/Ratio/Mix/Education)	RN Turn Over	

Assumptions:	External Factors:
1. KBN Synthesis are updated when significant evidence is published	1. Units have different physical/unit layouts (e.g. access to medication and computers
2. Usual level of leadership and staff turnover	2. Large scale system-wide implementation of new EHR system (complete by 2013)
3. No signficant change in unit layout or care delivery process	3. System Strategic Plan focused on creating accountable care organization
4. Float pool nurses receive same level as Assigned Nursing Staff	4. External forces disseminating potentially competing work

Conceptual Model: Using Evidence-based Interactions to Engage Patients



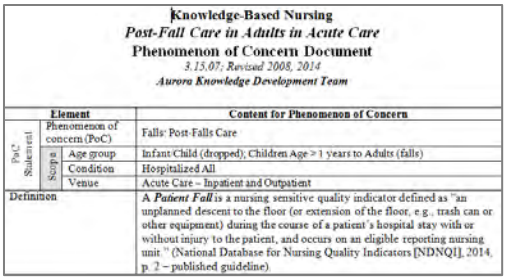
APPENDIX B. Knowledge-based Nursing (KBN) Innovation Core Concepts

Core Components:

1) KBN is a chartered entity within the professional nursing infrastructure at the study institution with goals of contributing evidence-based recommendations to the system nursing practice council for embedding into the content of nursing policy and the EHR. The KBN Department is also responsible for governing the nursing content and workflows in the EHR.

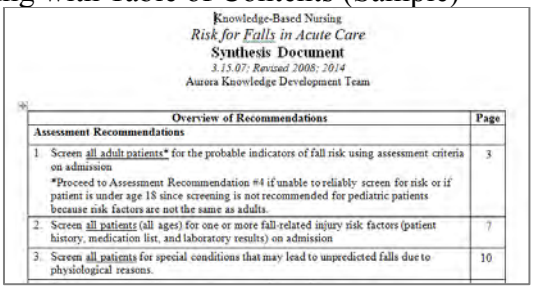
2) KBN Evidence Summaries focus on the independent role of the nurse:
   - "Phenomena of Concern" (POC) Documents (below) details the scope of the review including age, condition, venue, definition, and significance (internal/external rationale)
   - "Synthesis" Documents contain actionable recommendations based on nursing process:
     - Assessments: history and physical/psychosocial findings (with tools as appropriate)
     - Diagnosis: Risk and/or actual problems
     - Interventions: Monitoring for changes in status, intervening to prevent risk or manage problem, and engaging patient and family to support self-management (know and decide care)
     - Outcome evaluation for achievement by the close of the inpatient stay

   - POC Document and Synthesis Document starting with Table of Contents (Sample)



Knowledge-Based Nursing
Post-Fall Care in Adults in Acute Care
Phenomenon of Concern Document
3.15.07; Revised 2008, 2014
Aurora Knowledge Development Team

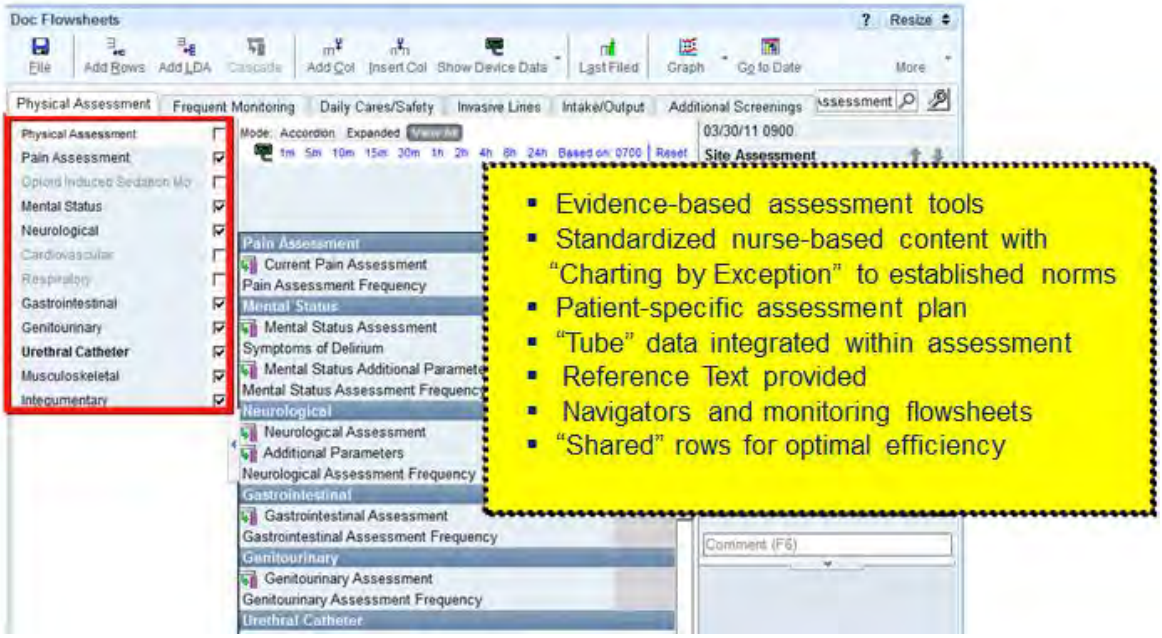
Element		Content for Phenomenon of Concern
PoC Statement	Phenomenon of concern (PoC)	Falls: Post-Falls Care
	Scope: Age group	Infant-Child (dropped); Children Age > 1 years to Adults (falls)
	Scope: Condition	Hospitalized All
	Scope: Venue	Acute Care – Inpatient and Outpatient
Definition		A ***Patient Fall*** is a nursing sensitive quality indicator defined as "an unplanned descent to the floor (or extension of the floor, e.g., trash can or other equipment) during the course of a patient's hospital stay with or without injury to the patient, and occurs on an eligible reporting nursing unit." (National Database for Nursing Quality Indicators [NDNQI], 2014, p. 2 – published guideline).



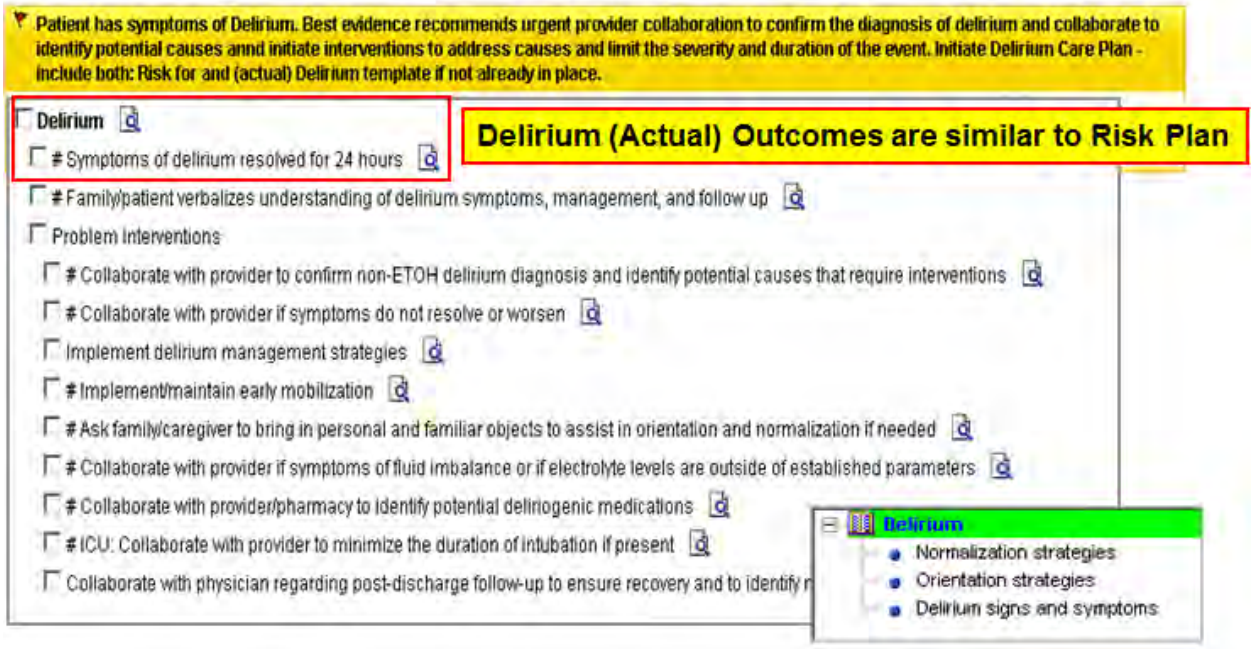
Knowledge-Based Nursing
Risk for Falls in Acute Care
Synthesis Document
3.15.07; Revised 2008; 2014
Aurora Knowledge Development Team

Overview of Recommendations	Page
Assessment Recommendations	
1. Screen all adult patients* for the probable indicators of fall risk using assessment criteria on admission *Proceed to Assessment Recommendation #4 if unable to reliably screen for risk or if patient is under age 18 since screening is not recommended for pediatric patients because risk factors are not the same as adults.	3
2. Screen all patients (all ages) for one or more fall-related injury risk factors (patient history, medication list, and laboratory results) on admission	7
3. Screen all patients for special conditions that may lead to unpredicted falls due to physiological reasons.	10

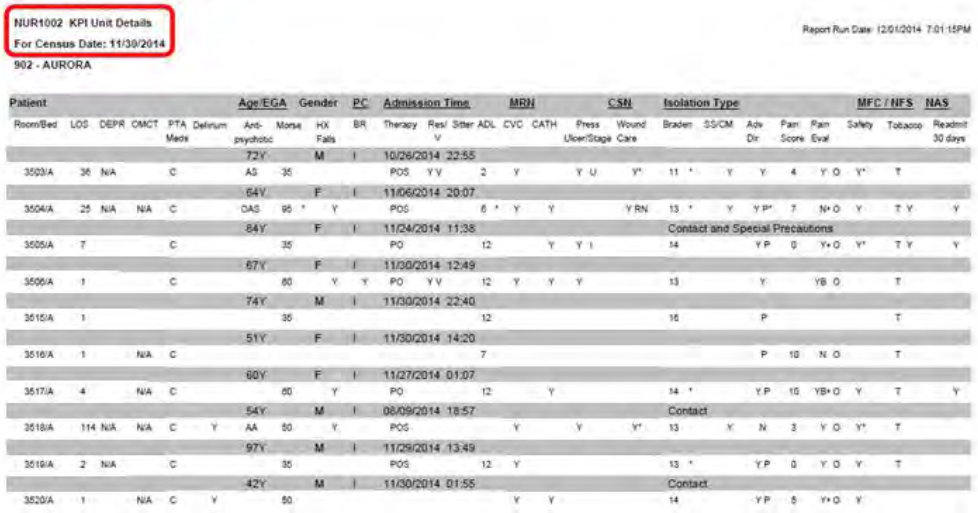
3) **POC-specific content and clinical decision support tools in the EHR**
   - Standardized assessments including reliable/valid assessment tools



- Designing evidence-based care planning processes to fit into the nursing workflow
  - Renewing the focus on planning and evaluating patient care
  - Creating clinical decision-support (CDS) tools to identify risks and actual problems
  - Designing care plans to plan care and link with flowsheets to "associate" documentation of patient status and/or interventions with the plan of care.



- Electronic reports are used to support quality improvement and research
  - POC-specific content can be extracted from the EHR for secondary use for patient care, quality improvement, and research
  - Reports are most effective when used to evaluate end-user skills and to provide near-real time feedback


NUR1002 KPI Unit Details
For Census Date: 11/30/2014
902 - AURORA
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Patient							Age/EGA		Gender	PC	Admission Time			MRN		CSN		Isolation Type					MFC / NFS		NAS
Room/Bed	LOS	DEPR	CMCT	PTA Meds	Delirium		Anti-psychotic	Morse	HX Falls	BR	Therapy	Res/V	Sitter	ADL	CVC	CATH	Press Ulcer/Stage	Wound Care	Braden	SS/CM	Adv Dir	Pain Score	Pain Eval	Safety	Tobacco	Readmit 30 days
							72Y		M	I	10/26/2014 22:55															
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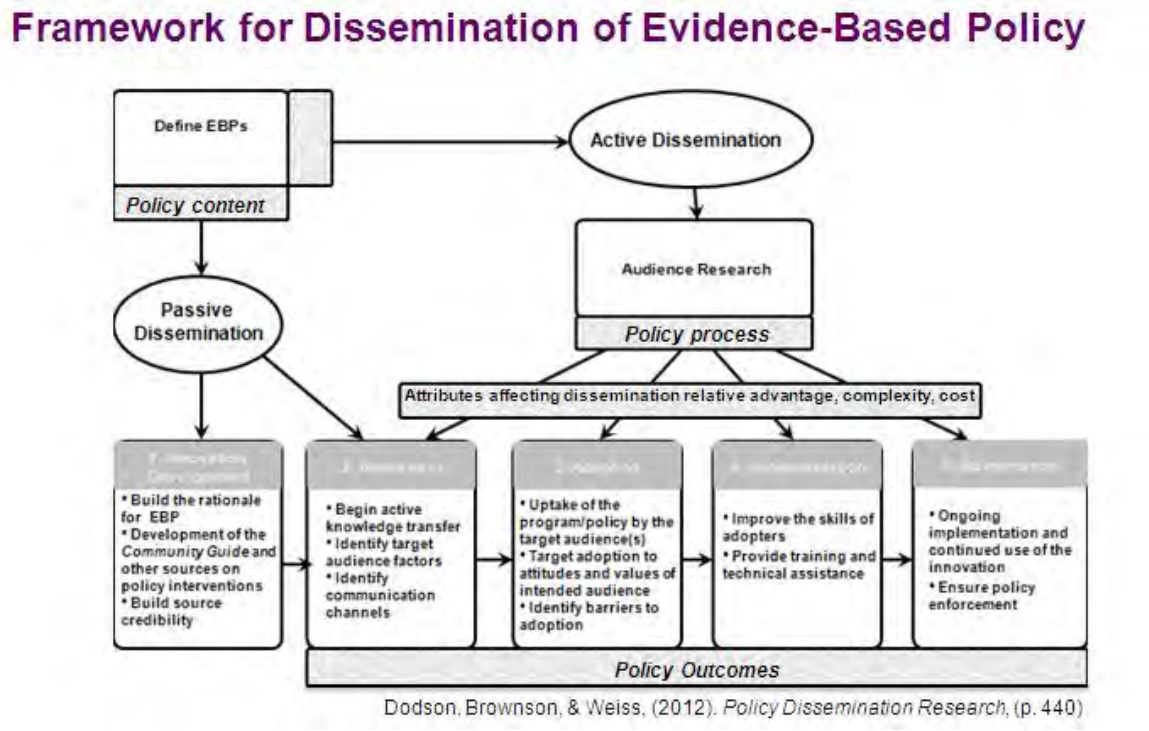
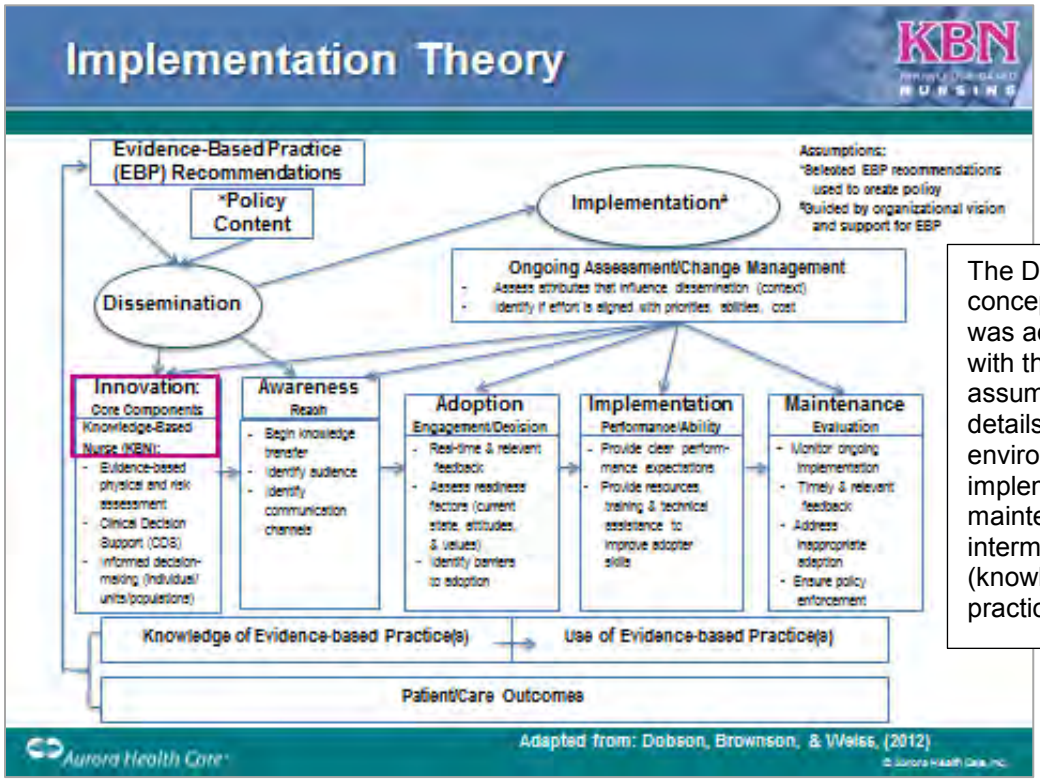
APPENDIX C. Dissemination & Implementation of Evidence-Based Practice Frameworks

Original Theory:



Dodson, Brownson, & Weiss, (2012). *Policy Dissemination Research*, (p. 440)

Adaption of Model by KBN Research Team (in collaboration with TIDIRH experts):



The Dodson, et al., conceptual framework was adapted for this study with the addition of assumptions, conceptual details for the environment, adoption, implementation, and maintenance, and two intermediary outcomes (knowledge and use of EB practices

APPENDIX D. Baseline Assessment

Unit Descriptions: Aurora St. Luke's Medical Center (ASLMC)

Random Assignment	Unit Type	# of Staff (3/2014)	Associated Units # Staff (3/2014)	Total Staff in Group	# Beds	Avg # IP/mo (3/2014)
ASLMC Critical Care Units (5 Units - 370 Staff; 74=Avg Staff /Unit; SD=16.6 Range=48-92)						
B	Neurosurgical ICU (3M/1L)	73	6KLM (37) 10LM (30)	140	16	96
B	Medical/Respiratory ICU (8T)	84	12S (25), 12T (20), 4KLM (34), 4EF (37) 9LM (29)	226	24	114
B	Surgical ICU (3L/3M)	48	3CD (25), 3EF (40), 8C (34),11S (24), 11T (26)	197	14	70
A	Coronary ICU (8S)	73	5KLM (20), 10S (31), 10T (32), 11LM (25)	181	24	118
A	Cardiovascular Surgical ICU (7T)	92	9S (39) 9T (34)	165	30	92
A	Clinical Staffing Service (CSS/Float Pool)	35		35		
ASLMC Medical/Surgical Units 18 Units – 542 Staff – 30 = Avg Staff/Unit; SD=6 Range=20-40						
11 S	Orthopedics/Surgical	24	SICU		24	150
11T	Orthopedics/Surgical	26	SICU		24	154
12 S	Oncology	25	MRICU		24	103
12T	Oncology	20	MRICU		24	94
3CD	Surgical	25	SICU		23	125
3EF	Surgical	40	SICU		26	134
4EF	Medical/Telemetry	37	MRICU		26	143
4KLM	Medical	34	MRICU		32	139
5KLM	Medical	20	CICU		28	130
6KLM	Surgical Neurology	37	NEICU		33	83
8 Center	Med/Surg Transplant	34	SICU		23	131
9LM	Medical/Telemetry	29	MRICU		23	108
10LM	Medical/Neurology	30	NEUICU		28	114
11LM	Medical/Heart Failure	25	CICU		23	104
9S	Cardiac Surgical Step Dn	39	CVICU		24	81
9T	Cardiac Surgical Step Dn	34	CVICU		24	73
10S	Cardiac Procedural	31	CICU		24	91
10T	Cardiac Medical	32	CICU		24	121
Total		**947**				**2,568**

Nurse Survey

- The Nurse Survey was used to evaluate unit context (Alberta Context Tool), perceptions about Research Utilization, and Staff Nurse and Leader knowledge of essential Practices for all 6 topics and workflow
- Survey participant reported BSN (72%) – slightly higher than the general population
- Survey participants were more likely to be certified (25%), more than the general population of staff nurses who work on the inpatient units at the facility.
- Note: The Nurse Survey did not include a question about role to support confidentiality.

Nurse Survey – Participant Characteristics

Staff Nurse Characteristics	Baseline T1 (n=436)		Population T1 N=947
	N	%	
Education			
ADN/Diploma	99	21 %	
BSN	342	72 %	650 (68.6%)
MS or Higher	34	7 %	17 (1.8%)
Certification			
Yes	113	25%	110/567 (19.4%)
Shift Length			
12 hour only	215	45%	
8 & 12 hour	111	23%	
Role (Advancement Model)			
Competent/Accomplished			370 (39%)+ 212 (22%) = 588 (61%)
Proficient/Expert			123 (14%)+ 199 (21%) = 322 (34%)
Other (Graduate/Unstaged/Unknown)			43 (5%)

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- Nurse Survey Leader participants were likely to have BSN/MSN and certified when compared with the population of all Nurse Leaders including Managers, Clinical Nurse Specialists, and Nurse Clinicians

Nurse Survey Participant Characteristics

Leader Characteristics	Baseline Survey		Population
	N	%	
Manager (N=24 Units)			
Education	19		N=20
< BSN	0		1 (4%)
BSN	13	68%	15 (62.5%)
MS or Higher	6	32%	4 (17%)
Certification	8	42%	6 (25%)
Clinical Nurse Specialist / Nurse Clinician (N=23)			
Education	18		N=23
BSN	6	33%	8 (35%)
MS or Higher	11	61	12 (52%)
Other	0	0	3 (13%)
Certification	13	72%	13 (65%)
Multiple Units	2	11%	2

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The **Nurse Survey** was distributed using the Learning Connection. Funding was provided to allow staff to participate on work time.

Overall Participation Rate: 48%
46% Staff
86% Leaders

Unit Context

	Baseline (n=479)	
	N	%
Completed KBN Learning Modules		
Some modules (1-5)	173	36%
All Epic modules (6-8)	194	41%
None or Did not answer (0/missing)	112	23%
Structural & Electronic Resource Use at Work (last typical month) – Never/Rarely/NA		
Policies and procedures (SER 5)	57	12%
Clinical Practice guidelines (SER 6)	72	15%
Clinical decision-support (CDS) SER 8	205	44%
Staffing - Disagree or Strongly Disagree		
Enough Staff for Necessary Work	141	30 %
Enough Staff to Deliver Quality Care	176	38 %

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Knowledge – Subscale Scores

Subscale Score	N	Average # Correct (Mean)	Std Dev	Min	Max	% Correct	High % Correct
Pain (9Q)	479	4.3*	1.8	0	8	47.3	89
Medication Adherence (4Q)	479	2.6	1.2	0	4	64.0	100
Depression/Suicide (5Q)	479	3.5*	1.4	0	6	69.2	100
Fall Risk (6Q)	479	3.3*	1.5	0	6	55.1	100
Pressure Ulcers (4Q)	479	2.0*	1.2	0	4	49.3	100
Delirium (4Q)	479	1.5	1.1	0	4	38.7	100
Workflow (9Q)	479	5.4*	2.7	0	9	60.4	100
Total Score (41Q)	479	22.7*	8.5	0	38	55.3	93

*Sign diff LxS
No diff by Unit Type

Key: Total Score includes # Correct, # Not Correct, and # Missing (approx 10%)
High % Correct refers to person who scored the highest in each group

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Nurse Survey Knowledge Test Summary:
At baseline, the average total score was 55.3% correct, scoring lowest in their knowledge of best practices related to pain and delirium. Leaders scored statistically higher on the Knowledge Test than Staff in Total and for all subscales except Medication Adherence and Delirium. There were no significant differences in Knowledge Scores by Unit type.

The KBN Impact Study Observations Schedule was distributed in advance. Units were advised to conduct care under usual patient care circumstances with no requirement for leader presence.

Blinded and trained KBN Team members reviewed the prepared patient list and identified the nurse who had the highest number of selected patients to observe for the 6 hour session. The observers focused on their assigned nurse during patient care and documented their activities on the data collection tool including when they participated in daily unit-based Outcome Facilitation Rounds (OFTs). Observers also recorded instances of Nurse Leader interaction on the unit regarding the study phenomenon (e.g. during huddles, rounds, or on the unit with the staff.

Observations by Unit

Details	Baseline		Population
	N	%	Avg IP/mo
Total Observations	379	100	160
Critical Care (5 units)	85	22.4	159
Moderate Acuity (5 units)	69	18.2	162
Blended Acuity (2 units)	37	9.8	140
Combined Med/Surg (6)	102	26.9	172
Medical (5 units)	86	22.7	152
Day Shift Observations	341	90%	
Average / Ratios	Mean	SD	Range
# Obs Pts / Unit	16.5	2.3	11 - 21
RN : Pt Ratio – ICU	1.9	0.4	1 - 2
RN:Pt Ratio Non-ICU	4.0	0.7	2 - 6

Patient Characteristics	Baseline T1 (N=379)		
	N	%	X – SD Range
Age (yrs)			64.2 ± 16.6 16 – 101
Day of Stay			8.0 ± 12.2 1 – 128
Male	179	47.3	
Surgical	154	40.6	
30 Day Readmit	103	27.2	
Isolation	83	21.9	
Hx Dementia	35	9.2	
Not Taking Meds As Prescribed	11	2.9	

Observed RN Characteristics – All Units

Characteristics	Baseline T1		Population (N=847 RNs)
	N	%	
Unit RN Observed	116	12.2	947
Patients Observed			
All Units	379		
Patients Observed by RN Type			
Unit RN	368	97	
Float RN	11	3	
Patients Observed by RN Job			
Competent	174	45.9	39%
Accomplished	69	18.2	22%
Proficient	42	11.1	13%
Expert	61	16.1	21%
Other	33	8.7	5%

The Observers recorded any instances when they observed the nurses speaking about or doing behaviors that related to any of the 6 evidence-based topics under study. The Observers were blinded, meaning that they were observing without knowing specific history or care details about the patient.

Each unit had an average of 16.5 patients who were observed during the baseline time frame.

Most of the observations occurred on the Day Shift (90%), with unit Staff Nurses (97%). More than half (61%) of the observations were completed with RNs in competent or accomplished RN Job code.

When the observations were finished the sheets were reviewed and entered into SurveyMonkey as the first step tin the audit process.

Nurse Leader Observations - Baseline

Nurse Leaders were observed for Knowledge & Use of EBP Behaviors

- 2 observation days per non-critical care unit (63%)
- 3 - 5 observation days for each critical care unit (37%)
- 5 evening shifts did not yield any leader observations (excluded)
- PCMs (n=23) - 49 Observation Days
- CNSs (n=15) - 39 Observation Days
- NCs (n=6) - 10 Observation Days
- Locations: Huddles, OFTs (Rounds) or on Unit interacting with Staff
- Outcome Facilitation Team Meetings (Rounds):
  - Mean duration=41"± 14"
  - Leaders present 74%
- Observation Frequency varied by Unit Type
  Critical Care: 44%; Comb Med/Surg: 33%, Blended: 13%
  Medical: 5%; Moderate Acuity: 4%
- Behavior use varied by Role; Leaders demonstrated more than one behavior when they were observed.

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Nurse Leader Observations Baseline

All Units (23 Units; N=49 Observation Days)

	PCM (N=23)				CNS (n=15)				NC (n=6)			
	Uses Reports	Demonstrates Knowledge	Coaches	Collaborates	Uses Reports	Demonstrates Knowledge	Coaches	Collaborates	Uses Reports	Demonstrates Knowledge	Coaches	Collaborates
Huddles				1								
OFTs	0	2	1	2	8	22	24	9	0	1	1	0
On Unit					2	1	1					
Topics:												
Pain		2	1	3		7	8	2				
Med Adh												
Dep/Suic						1	1					
Falls						5	6	4				
PU						6	4	3				
Delirium						4	6					
Actual Obs	4/49 (8%)				18/39 (46%)				2/10 (20%)			

Note: 93% of Leader Observations occurred during OFTs

Nurse Leaders were observed during unit observations during Q2 2014 (3 months).

Observers recorded any instances when they observed the leaders speaking or doing behaviors that related to any of the 6 evidence-based topics under study.

Summary- Nurse Leader Observations: At baseline, nurse leaders were observed engaging with staff primarily during daily "OFT" rounds (93%).

CNSs had the majority (67/75; 89%) of documented observations where they were seen demonstrating EB knowledge and use of supportive leader behaviors, Some of the CNSs in Study Group B were already using the electronic reports. Pain, Falls, and Pressure Ulcers were the topics where Leaders were most often observed engaging staff about evidence-based practice.

Population Characteristics (18 Units)

Population	Eligible	Exclusion	Deferral	Opt Out	Subject
Baseline -T1	581	170 (29.3%)	128 (22%)	99 (17%)	184 (31.7)
Details		Activated POA (n=32) Dementia (n=15) Day of Discharge (n=33) Perm Inability of Learn (n=7) Discharged/Post Screen (n=33) Refusal (n=38) Cognitive Issues (n=4) Communication Barriers (n=8) Other (n=2)	Mental Status Abnormality (n=87) Excessive Pain (n=5) Physically unable to participate (n=7) Off Unit (n=13) Enrollment met; not needed (n=10) Teaching done other unit (n=4) Discharge without screening (n=1) Other (n=1)		

Patient Survey (N=184)

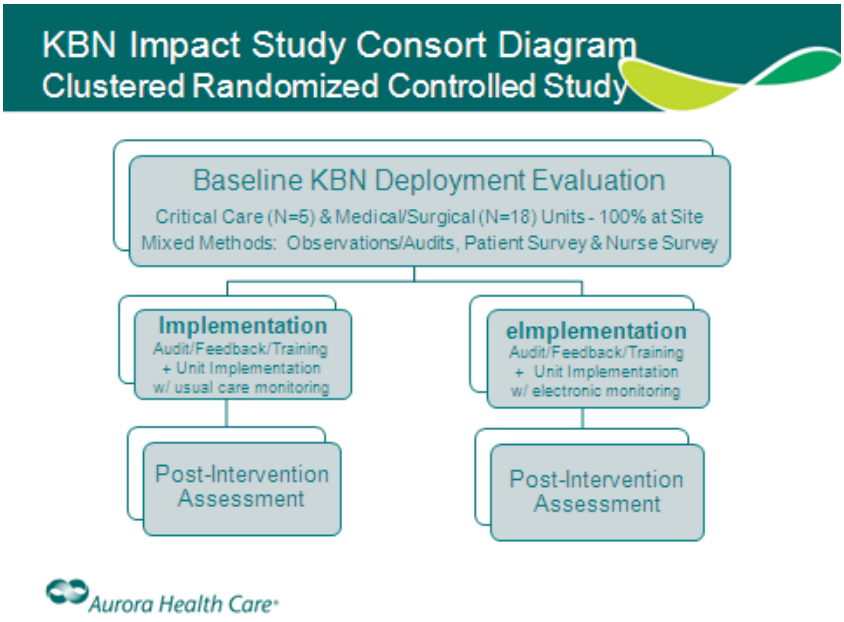
- Demographics – Med/Surg Patients
  - Age: Average= 61.2 yrs (SD=15.8; 20 – 99 yrs)
  - Female (52%)
  - Race/Ethnicity
    - Caucasian (73%)
    - White/Hispanic (4%)
    - Black / Afro-American (20%)
    - Asian (3%)
  - 30 Day Readmissions (27%)
  - Learning Assessments
    - Missing (7%)
    - Current Stay (50%)
    - Prior Stay (43%)
  - No Barriers to Learning (87%)

Patient Survey:
Med/Surg patients (N=581) were screened and recruited to participate in the Patient Survey. Patients were asked about the teaching method and the qualities of the nurse patient interaction and about their preferences. They were also asked if they recalled specific details about to determine if the nurses to delivered the evidence-based information to patients and to what extent that the patient report knowledge and use of the recommended care practices.

Patient Perceptions about Teaching

Baseline			
Subjects who Recall RN Teaching		N=166 / 184 (90%)	
Method (how)	Explanations during Care	153	92%
	Explanations during Teaching Session	4	2%
	Demonstration	3	2%
Good Way to Learn = Yes		153	92%
Time of Day:	No specific time	48	29%
	Any time doing care	79	48%
Time of Day:	Acceptable=Yes	152	92%
Nurses Explains Things Well		148	89%
Reported Asking Questions		138	83%
Nurses Listen		153	92%
Nurses Kind and Courteous		160	96%
Nurses Involve You in Your Plan of Care		98	59%

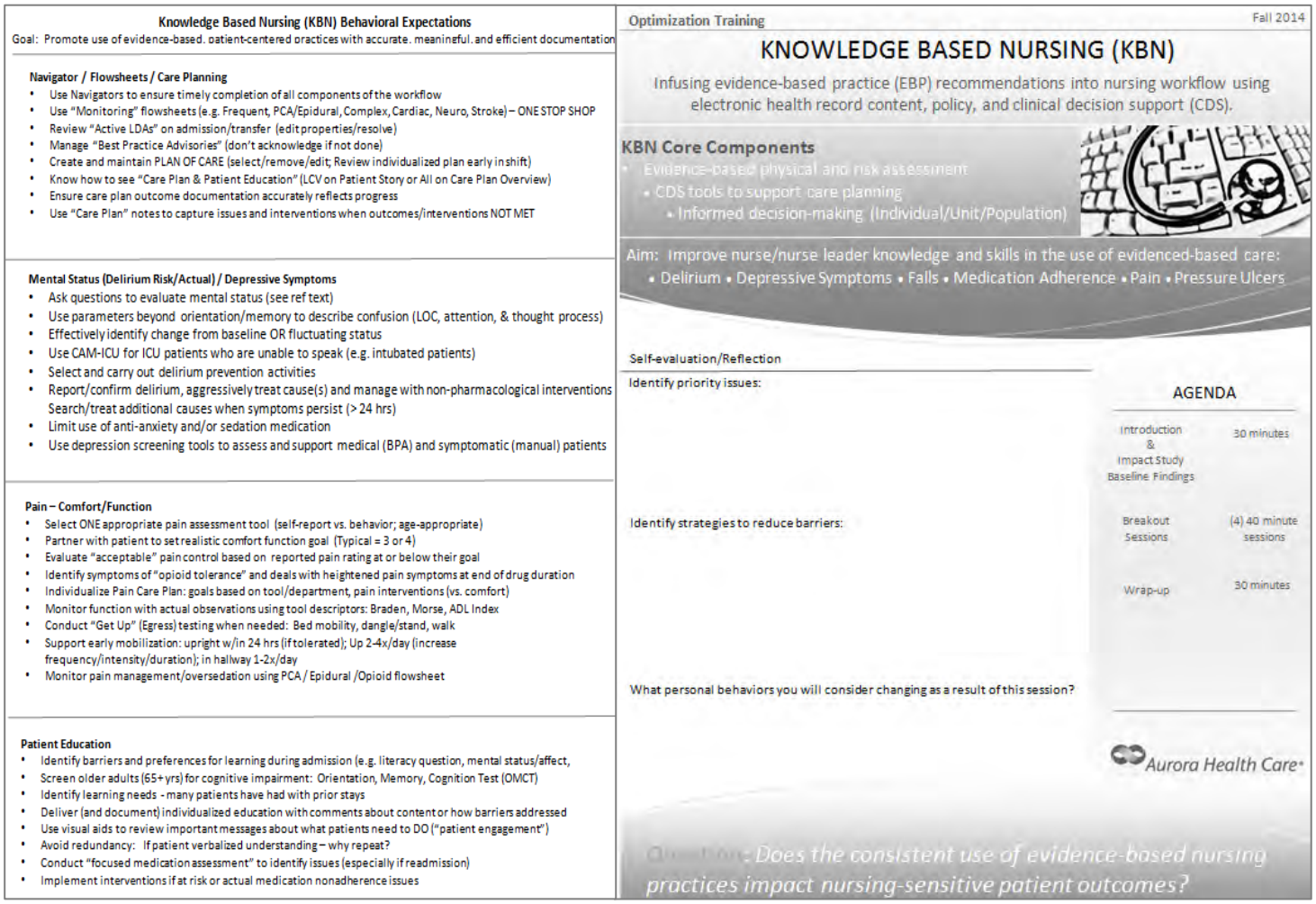
APPENDIX E. Study Intervention with Varied Maintenance Strategies (Group A & B)



Baseline findings indicated that knowledge scores were low in basic evidence-based practices and nurse leaders had limited interaction with staff outside of OFTs. Behavioral Expectations were drafted and distributed during the training and to guide units in selecting their priority projects for implementation.

Additional funding was provided to engage (2) unit preceptors for each unit to support unit implementation efforts.

Training Sessions: Audit/Feedback Results with Behavioral Expectations and EB Content



Knowledge Based Nursing (KBN) Behavioral Expectations

Goal: Promote use of evidence-based, patient-centered practices with accurate, meaningful, and efficient documentation

Navigator / Flowsheets / Care Planning

- Use Navigators to ensure timely completion of all components of the workflow
- Use "Monitoring" flowsheets (e.g. Frequent, PCA/Epidural, Complex, Cardiac, Neuro, Stroke) – ONE STOP SHOP
- Review "Active LDAs" on admission/transfer (edit properties/resolve)
- Manage "Best Practice Advisories" (don't acknowledge if not done)
- Create and maintain PLAN OF CARE (select/remove/edit; Review individualized plan early in shift)
- Know how to see "Care Plan & Patient Education" (LCV on Patient Story or All on Care Plan Overview)
- Ensure care plan outcome documentation accurately reflects progress
- Use "Care Plan" notes to capture issues and interventions when outcomes/interventions NOT MET

Mental Status (Delirium Risk/Actual) / Depressive Symptoms

- Ask questions to evaluate mental status (see ref text)
- Use parameters beyond orientation/memory to describe confusion (LOC, attention, & thought process)
- Effectively identify change from baseline OR fluctuating status
- Use CAM-ICU for ICU patients who are unable to speak (e.g. intubated patients)
- Select and carry out delirium prevention activities
- Report/confirm delirium, aggressively treat cause(s) and manage with non-pharmacological interventions Search/treat additional causes when symptoms persist (> 24 hrs)
- Limit use of anti-anxiety and/or sedation medication
- Use depression screening tools to assess and support medical (BPA) and symptomatic (manual) patients

Pain – Comfort/Function

- Select ONE appropriate pain assessment tool (self-report vs. behavior; age-appropriate)
- Partner with patient to set realistic comfort function goal (Typical = 3 or 4)
- Evaluate "acceptable" pain control based on reported pain rating at or below their goal
- Identify symptoms of "opioid tolerance" and deals with heightened pain symptoms at end of drug duration
- Individualize Pain Care Plan: goals based on tool/department, pain interventions (vs. comfort)
- Monitor function with actual observations using tool descriptors: Braden, Morse, ADL Index
- Conduct "Get Up" (Egress) testing when needed: Bed mobility, dangle/stand, walk
- Support early mobilization: upright w/in 24 hrs (if tolerated); Up 2-4x/day (increase frequency/intensity/duration); in hallway 1-2x/day
- Monitor pain management/oversedation using PCA / Epidural /Opioid flowsheet

Patient Education

- Identify barriers and preferences for learning during admission (e.g. literacy question, mental status/affect,
- Screen older adults (65+ yrs) for cognitive impairment: Orientation, Memory, Cognition Test (OMCT)
- Identify learning needs - many patients have had with prior stays
- Deliver (and document) individualized education with comments about content or how barriers addressed
- Use visual aids to review important messages about what patients need to DO ("patient engagement")
- Avoid redundancy: If patient verbalized understanding – why repeat?
- Conduct "focused medication assessment" to identify issues (especially if readmission)
- Implement interventions if at risk or actual medication nonadherence issues

Optimization Training — Fall 2014

KNOWLEDGE BASED NURSING (KBN)

Infusing evidence-based practice (EBP) recommendations into nursing workflow using electronic health record content, policy, and clinical decision support (CDS).

KBN Core Components

- Evidence-based physical and risk assessment
- CDS tools to support care planning
- Informed decision-making (Individual/Unit/Population)

Aim: Improve nurse/nurse leader knowledge and skills in the use of evidenced-based care:
• Delirium • Depressive Symptoms • Falls • Medication Adherence • Pain • Pressure Ulcers

Self-evaluation/Reflection

Identify priority issues:

Identify strategies to reduce barriers:

What personal behaviors you will consider changing as a result of this session?

AGENDA

Introduction & Impact Study Baseline Findings	30 minutes
Breakout Sessions	(4) 40 minute sessions
Wrap-up	30 minutes

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Question: Does the consistent use of evidence-based nursing practices impact nursing-sensitive patient outcomes?

Training Session Evaluation Results

Sessions: 44
Attendance: Leaders =45 and RN Staff = 849
Response Rages: Leaders (93%) and RN Staff (94%)

Leader N=42, RN N=801

1 At the end of this program, I am able to: Briefly describe what Knowledge-based Nursing (KBN) is and how evidence-based practices are embedded into the electronic health record to support patient care

	Leader		RN	
	N	**%**	**N**	**%**
Strongly Agree + Agree	39	92.86%	778	97.13%

2 At the end of this program, I am able to: Report two key findings from baseline that you find most relevant and appropriate for considering as a practice change

	Leader		RN	
	N	**%**	**N**	**%**
Strongly Agree + Agree	39	92.86%	741	92.51%

3 At the end of this program, I am able to: Validate and/or update your knowledge and skills in performing and efficiently documenting essential evidence-based practice recommendations related to:

	Leader		RN	
3a Navigators/Flowsheets/Care Planning	**N**	**%**	**N**	**%**
Strongly Agree + Agree	39	92.86%	776	96.88%
3b Mental Status	**N**	**%**	**N**	**%**
Strongly Agree + Agree	42	100%	786	98.13%
3c Pain	**N**	**%**	**N**	**%**
Strongly Agree + Agree	41	97.62%	784	97.88%
3d Pt. Education	**N**	**%**	**N**	**%**
Strongly Agree + Agree	41	97.62%	723	90.26%

5 How committed are you to implementing these practices?

	Leader		RN	
	N	**%**	**N**	**%**
Strongly Agree + Agree	40	95.24%	765	95.51%

6 Would you recomment this training session to others in your role?

	Leader		RN	
	N	**%**	**N**	**%**
Strongly Agree + Agree	39	92.86%	687	85.77%

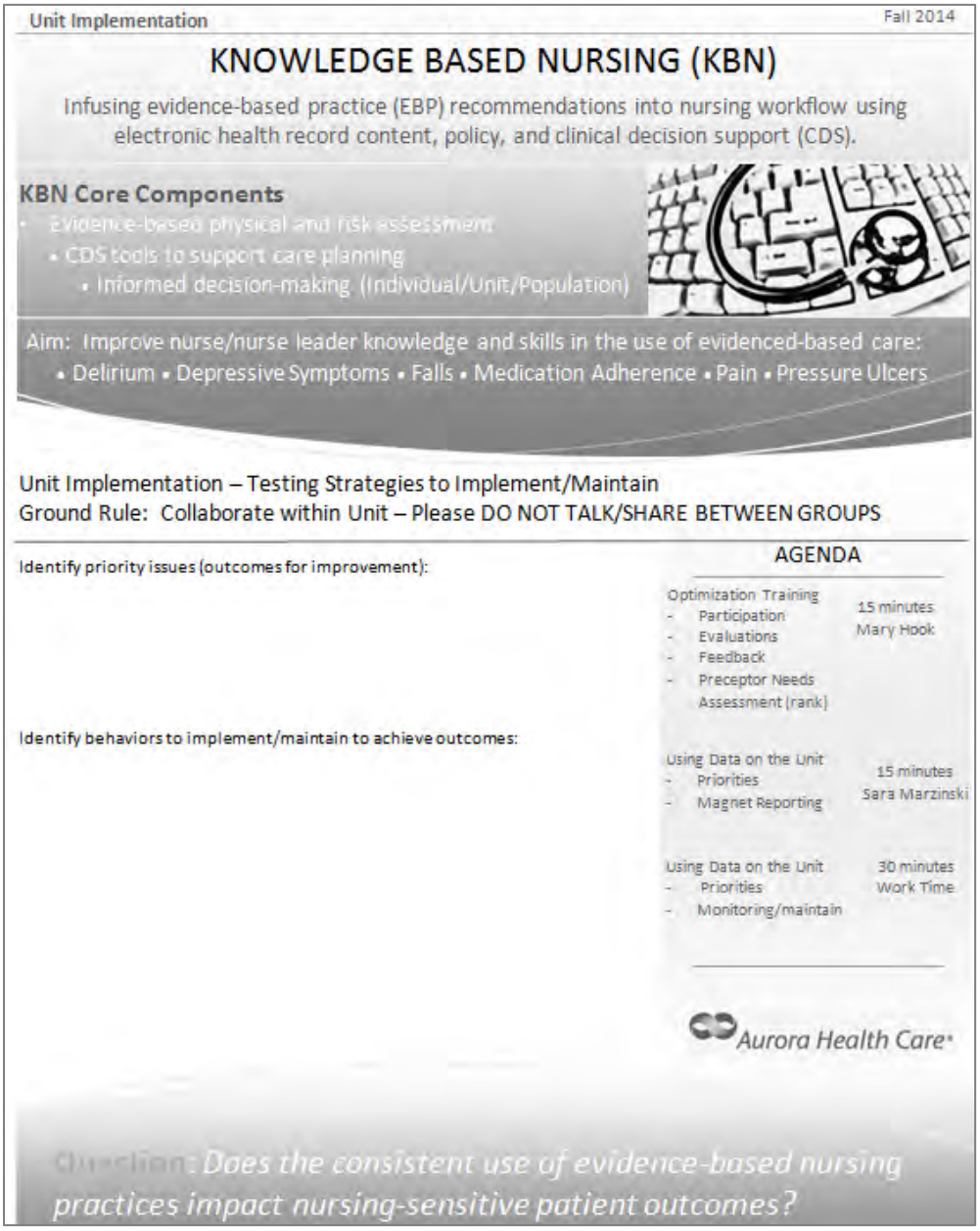
7 Identify breakout sessions where your knowledge of the topic increased after participation:

	Mental Status/ Depression	**Pain/Function**	**Patient Ed/Med Adherence**	**Navigators/Flowsheets/Care plan**
Leader (N)	**26**	**16**	**13**	**28**
Leader (%)	61.90%	38.10%	30.95%	66.67%
RN (N)	**492**	**264**	**220**	**489**
RN (%)	61.42%	32.96%	27.47%	61.05%

Unit Implementation

Units were randomized into two groups with varied maintenance strategies
All units received unit-level results and asked to prioritize implementation efforts. Leaders and preceptors attended a formal 2 hour training course

- Group A: Unit feedback, Leader and Preceptor Course with directions to use usual practices to monitor and support implementation
- Group B: Unit feedback, Leader and Preceptor Course and additional training (below) re: the use of the electronic "Key Performance Indicator" (KPI) Unit Details Report to support them to monitor the use of the practices with limited time.



Training for Varied Maintenance Strategy for Group B: Additional training and support re: the "Key Performance Indicator" Unit Details Daily Report to support monitoring

NUR1002 KPI Unit Details
For Census Date: 11/30/2014
902 - AURORA

Report Run Date: 12/01/2014 7:01:15PM

Patient						Age/EGA		Gender	PC	Admission Time				MRN			CSN	Isolation Type					MFC / NFS		NAS
Room/Bed	LOS	DEPR	OMCT	PTA Meds	Delirium	Anti-psychotic	Morse	HX Falls	BR	Therapy	Res/V	Sitter	ADL	CVC	CATH	Press Ulcer/Stage	Wound Care	Braden	SS/CM	Adv Dir	Pain Score	Pain Eval	Safety	Tobacco	Readmit 30 days
						72Y		M	I	10/26/2014 22:55															
3503/A	36	N/A		C		AS	35			POS	Y V		2	Y		Y U	Y*	11 *	Y	Y	4	Y O	Y*	T	
						64Y		F	I	11/06/2014 20:07															
3504/A	25	N/A	N/A	C		OAS	95 *	Y		POS			6 *	Y	Y		Y RN	13 *	Y	Y P*	7	N* O	Y	T Y	Y
						84Y		F	I	11/24/2014 11:38								Contact and Special Precautions							
3505/A	7			C			35			PO			12		Y	Y I		14		Y P	0	Y* O	Y*	T Y	Y
						67Y		F	I	11/30/2014 12:49															
3506/A	1			C			60	Y	Y	PO	Y V		12	Y	Y	Y		13		Y		YB O		T	
						74Y		M	I	11/30/2014 22:40															
3515/A	1						35						12					16		P				T	
						51Y		F	I	11/30/2014 14:20															
3516/A	1		N/A	C									7							P	10	N O		T	
						60Y		F	I	11/27/2014 01:07															
3517/A	4		N/A	C			60	Y		PO			12		Y			14 *		Y P	10	YB* O	Y	T	Y
						54Y		M	I	08/09/2014 18:57								Contact							
3518/A	114	N/A	N/A	C	Y	AA	60	Y		POS				Y		Y	Y*	13	Y	N	3	Y O	Y*	T	
						97Y		M	I	11/29/2014 13:49															
3519/A	2	N/A		C			35			POS			12	Y				13 *		Y P	0	Y O	Y	T	
						42Y		M	I	11/30/2014 01:55								Contact							
3520/A	1		N/A	C	Y		60							Y	Y			14		Y P	5	Y* O	Y		

Legend: DEPR=Depression (Addl Scr): Y=Done; (*) Score >5 (Mild/Mod Dep); N/a = surgical/ICU; UTA= Unable to assess; OMCT (Addl Scrn) Y=Done; (*) Score >7 (Mild imprmt); PTA Meds: C=Complete; (*) Not taking meds. Delirium = Symptoms present or CAM-ICU (+) within last 48 hours, Anti-psychotic = Haloperidol (H) / Seroquel (S), Zyprexa, (Z), Risperdone (R) Abilify (A) &O=Ordered,A=Administered in last 48 hrs, Morse = Morse (* = Current Score > Admit Score), HX Falls = Morse History of Falls - *=Inpatient Fall, BR = Bed rest (MD Order), Therapy = Therapy (P=P/T,O=O/T,S=Speech), Res/V = Restraints w/ Ventilator (V) mode entered, Sitter = Charges for a sitter entered for the prior day, ADL=ADL (* = Current Score < Admit Score), CVC= Central Line = Y (Inserted Current Visit) or Y* (Inserted PTA), CATH = Urinary Catheter= Y (Inserted Current Visit) or Y* (Inserted PTA). Press Ulcer=Y (Present on Admission) or Y*(Acquired Current Visit), Stage documented in last 7 days = Blank = Not Documented or Not a Pressure Ulcer, I=Stage I, DTI= Suspected deep tissue injury, U= Unstageable/necrotic tissue, MM=PU on mucous membrane, II= Stage II, III = Stage III, IV = Stage IV, Wound Care=Y=Consult: RN, MD or (*)=Both RN MD, Braden=Braden (* = Current Score < Admit Score), SS/CM: Y= Consult Social Services/Care Management, Adv Dir = Advance Directives: Y= Yes, N=No, P=Power of Attorney for Healthcare, L=Living Will, D=DNR, G=Guardianship, I=Interim, O=Other,(*) = POAHC Activated; Pain Score=LCV Pain Score, Pain Eval LCV: Y= Acceptable: N=Unacceptable: (*)= 2+ unacceptable evals in row past 24 hrs. B=Beh Tool for Confused/AD only: O=Opioid given last 24 hrs: Safety:Y= Points Partnering, ID & Hand Hygiene =Verb/Demo - (*) if >48 hrs of admit. Tobacco: T=current/past Smoker: Y= Verb/Demo,(*) if >48 hrs; 30 Day Readmission=Y; Maternal Feeding Choice (MFC)/Neonatal Feeding Status (NFS): B=Breast, F=Formula, B+F = Breast + Formula, NFS=(*) if Breast & ANY Formula w/ Supp indications (LCV) =Biological (B),

Preceptor Tracking Tool

Name: ______________________________
Unit: ______________________________

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DATE	# OF HOURS	ACTIVITY (check all that apply)	Comments
		Preceptor Training - Parkway Training Center	
		□ Education □ Leader collab. □ Auditing □ Informal f/u w/staff □ Preceptor-Preceptor collab.	
		□ Formal f/u (ACC meeting) □ OFT's/Huddle □ Other:____________	
		□ Education □ Leader collab. □ Auditing □ Informal f/u w/staff □ Preceptor-Preceptor collab.	
		□ Formal f/u (ACC meeting) □ OFT's/Huddle □ Other:____________	
		□ Education □ Leader collab. □ Auditing □ Informal f/u w/staff □ Preceptor-Preceptor collab.	
		□ Formal f/u (ACC meeting) □ OFT's/Huddle □ Other:____________	
		□ Formal f/u (ACC meeting) □ OFT's/Huddle □ Other:____________	
		□ Education □ Leader collab. □ Auditing □ Informal f/u w/staff □ Preceptor-Preceptor collab.	
		□ Formal f/u (ACC meeting) □ OFT's/Huddle □ Other:____________	
		□ Education □ Leader collab. □ Auditing □ Informal f/u w/staff □ Preceptor-Preceptor collab.	
		□ Formal f/u (ACC meeting) □ OFT's/Huddle □ Other:____________	
		□ Education □ Leader collab. □ Auditing □ Informal f/u w/staff □ Preceptor-Preceptor collab.	
		□ Formal f/u (ACC meeting) □ OFT's/Huddle □ Other:____________	
Total Hours			

Hours should be charged to the KBN Study org and area (505-3969). Either use the Kronos clock or work with your timekeeper to transfer hours.

Please return this form to Nichole Nikolic (email: nichole.nikolic@aurora.org,or fax: 414-219-5693)

Additional Information Gathered from Preceptors

Preceptor Characteristics

	N	%	M	SD	Range	Median	Formal Training
RN Years Total	48	100	6.4	6.7	0.5 – 34	5.0	
Critical Care	10	21	10.7	10.2	1.0 - 34	8.0	
Mod Acuity	10	21	4.6	5.0	0.5 - 11	5.0	
Blended Acuity	4	8	11.8	10.6	3.0 – 27	8.5	
Combined Med/Surg	12	25	4.5	3.1	1.0 – 10.0	4.5	
Medical	10	21	3.9	2.3	0.6 - 7	3.5	
Preceptor Years Total	48	100	4.4	5.4	0 – 25	3.0	17 (35%)
Critical Care	10	21	7.0	7.4	0 - 24	4.0	4 (40%)
Mod Acuity	10	21	2.8	3.5	0 - 10	1.5	1 (10%)
Blended Acuity	4	8	10.5	10.1	2 - 25	7.5	2 (50%)
Combined Med/Surg	12	25	2.9	2.7	0 – 8.0	3.0	5 (42%)
Medical	10	21	2.3	2.3	0 - 5	1.0	5 (50%)
Study Hours / Preceptor Total	1007	100	21.0	13.0	0 – 47.3	20.9	Avg Hrs / Unit
Critical Care	267.5	26.6	26.75	16.2	6.5 – 47.3	24.9	53.5 ± 28.4
Mod Acuity	237.5	23.6	23.75	9.3	9.5 – 38.8	23.25	47.5 ± 18.5
Blended Acuity	38.8	3.9	9.7	8.1	1.8 – 17.5	9.8	19.4 +19.6
Combined Med/Surg	263.3	26.1	21.9	9.9	0 – 50.75	24.3	43.9 ± 21.5
Medical	184.5	18.4	18.5	13.3	4.8 – 29.3	18.1	61.5 + 21.7
Float Pool (15 RN/10 Preceptor Yrs; No Train)	15.5	1.5	7.5	0.7	7.3 – 8.3	7.8	15.5

Preceptor Characteristics

	N	%	M	SD	Range	Median	Training
RN Years Total	48	100	6.4	6.7	0.5 – 34	5.0	
A Surveillance Method (Usual)	18	37.5	7.8	9.0	0.5 - 34	5.0	
B Surveillance Method (eReports)	30	62.5	5.7	5.1	1.0 - 27	5.0	
Preceptor Years Total	48	100	4.4	5.4	0 – 25	3.0	17 (35%)
A Surveillance Method	18	38	4.7	6.4	0 - 24	2.0	6 (33%)
B Surveillance Method	30	62.5	4.2	4.9	0 - 25	3.0	11 (37%)
Study Hours/Preceptor Total	1007	100	21.0	13.0	0 – 47.3	20.9	Avg Hrs / Unit
A Surveillance Method	347.5	34.5	19.3	10.1	6.5 – 38.8	19.0	38.6 ± 19.8
B Surveillance Method	659.5	65.5	22.0	14.5	0 – 47.3	24.1	44.0 ± 24.7
Preceptor Efforts							
Surveillance Tool Skills	30	%	**Logs=Audits (unit)**			N	%
A Surveillance Method	n/a	n/a	A Surveillance Method			8	89
B Surveillance Method	14	50	B Surveillance Method			13	87
Logs=Leader Collaboration	24		**Logs=Education (unit)**			24	
A Surveillance Method	4	44.4	A Surveillance Method			6	67
B Surveillance Method	9	90.0	B Surveillance Method			11	73
Logs=Informal F/up (unit)	24		**Logs=Formal F/u (unit)**				
A Surveillance Method	6	67	A Surveillance Method			1	11
B Surveillance Method	12	80	B Surveillance Method			5	33

The Preceptors selected to support the project were varied. Several were highly seasoned, but many were not formally trained with less than 3 years of experience.

Preceptors at the primary site utilized their grant funded hours (Average ranged from 9.8 to 25 hrs/per person).

APPENDIX F: Findings from Primary Study Site

Unit Descriptors: Total and by Unit Type

Characteristics	Baseline (T1)		Population (T1)	Post (T2)		Population (T2)	Ttest
	N	%	Average / Unit	N	%	Average / Unit	(p)
Nurses	912		39.6 ± 20.6 / Unit R: 20 - 92	968		43.2 ± 20.4 / Unit R: 20 – 102	0.66
BSN	650	71	28.3 ± 15.1 R: 14 - 68	727	75	31.6 ± 15.7 R: 15 – 77	0.47
Certified / Eligible	110/567	19.4	4.8 ± 4.3 R: 0 - 14	99/556	17.8	4.3 + 4.2 R: 0 - 20	0.71
Role = Competent	370	40.6	16.1 ± 7.8 R: 8 - 31	374	38.6	16.3 ± 6.2 R: 6 - 31	0.93
Role = Expert	199	21.8	8.7 ± 9.7 R: 0 - 26	224	23.1	9.7 ± 10.8 R: 0 - 45	0.72
Turnover			13% ± 7 R: 5 – 25%				
Total Hours per Pt Day	23 Units	100	11.75 ± 3.5 T	23	100	12.11 ± 3.7 T	0.74
RN Hours per Patient Day	23 Units	100	8.0 ± 4.2 RN	23	100	8.2 ± 4.4 RN	0.85
Critical Care (5 Units)	RN:74/unit		15.5 ± 1.2	RN:77/unit		16.3 ± 1.4	0.42
Moderate Acuity (5 Units)	RN:34/unit		6.1 ± 0.6	RN:36/unit		6.4 + 0.2	0.43
Blended Acuity (2 Units)	RN:29/unit		6.1 ± 0.9	RN:31/unit		6.6 ± 0.9	0.61
Comb Med/Surg (6 Units)	RN:30/unit		5.7 ± 0.2	RN:33/unit		5.6 ± 0.2	0.61
Medical (5 Units)	RN:27/unit		5.7 ± 0.3	RN:30/unit		5.8 + 0.4	0.61

Aurora Health Care

The Post-Intervention Assessment was conducted during Q2 of 2015 (6 months after the Audit/Feedback and Training Sessions).

The Units were evaluated against the baseline findings 1 year prior (Q2, 2014).

The Units were the same (not statistically different) when the post evaluation was compared to baseline on key descriptors including number of nurses, roles, and Hours per Patient Day (HHPD).

Observations by Unit

Characteristics	Baseline		Population	Post-Intervention		Population
	N	%	Avg IP/mo	N	%	Avg IP/mo
Total Observations	379	100	160	361	100	159
Critical Care (5 units)	85	22.4	159	71	19.7	152
Moderate Acuity (5 units)	69	18.2	162	73	20.2	166
Blended Acuity (2 units)	37	9.8	140	38	10.5	158
Combined Med/Surg (6)	102	26.9	172	99	27.4	164
Medical (5 units)	86	22.7	152	80	22.1	160
	M, SD	Range		M, SD	Range	
# Obs Pts / Unit (Average)	16.5±2.3	11 - 21		15.7±1.9	13 - 19	
RN:Pt Ratio – ICU (Avg)	1.9±0.4	1 - 2		1.8±0.5	1 - 2	
RN:Pt Ratio Non-ICU (Avg)	4.0±0.7	2 - 6		4.2±0.7	3 - 5	
Day Shift Observations	341	90%		361	100%	

The Observations and Audits were conducted per protocol during the post-intervention period.

Note: The Observations were scheduled during the day shift exclusively during the post-time period to improve data capture of key elements including activities during OFT Rounds.

Nurse Leader Observations:

Nurse Leader Observations – Post

Nurse Leaders were observed for Knowledge & Use of EBP Behaviors

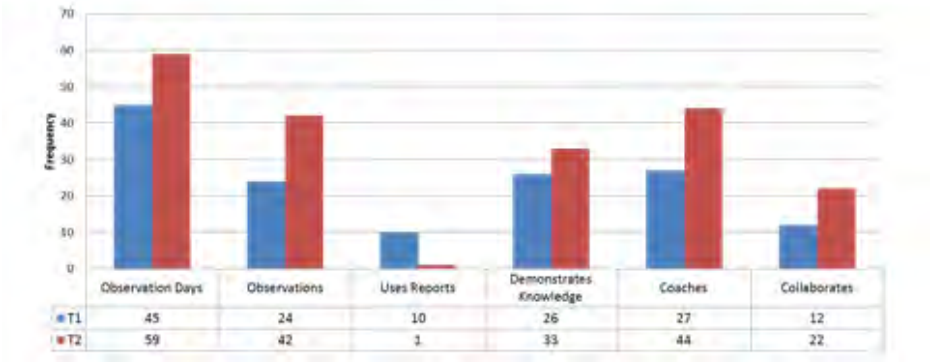
- 59 Observation Days
  - 19 Critical Care; 12 Mod Acuity; 4 Blended Acuity
  - 14 Combined Med/Surg; 10 Medical
  - All "Day" Shift observations (increase in leader observations)
- PCMs – 59 Observation Days
- CNSs (15) – 45 Observations Days on CNS Staffed/Covered Units
- NCs (6) - 14 Days on NC Staffed Units
- Locations: Huddles, OFTs (Rounds), and on Unit
- Day of Week: Avg 20% per day – Range: 15% Tues - 24% Wed
- Huddles: 15/60 – 90% <10"; 75% Leader present
- OFTs: Duration Mean = 38"±13; 88% Leader present

Nurse Leader Observations Post

All Units (23 Units; N=59 Observation Days)

	PCM (N=23)				CNS (n=15)				NC (n=6)			
	Uses Reports	Demonstrates Knowledge	Coaches	Collaborates	Uses Reports	Demonstrates Knowledge	Coaches	Collaborates	Uses Reports	Demonstrates Knowledge	Coaches	Collaborates
Huddles		1	1									
OFTs	1	6	13	7	0	13	25	11	0	7	4	2
On Unit		3					1			3		
Topics:												
Pain		2	5	1		3	6	2		2		1
Med Adh						1					1	
Dep/Suic			2				5	1		1		
Falls		1	4	6		6	5	5		3	1	
PU		4	3			3	6	3		2	1	
Delirium		3					4			2	1	1
Total Instances	1	10	14	7	0	13	26	11	0	7	4	2
Actual Obs	15/59 (25%)				20/45 (44%)				7/14 (50%)			

Leader EB Behavior T1 vs. T2



Adjusting to all Day Shift observations increased the frequency of Leader observations.

Leader/staff interaction continued to be primarily observed during the daily OFT meetings (91%). Leaders increased the instances when they were observed to demonstrate knowledge and/or coach on the focused topics during the post-intervention time frame.

Only one instance of electronic report usage was observed.

Nurse Survey Results:

RN Survey Participant Characteristics

Characteristics	Baseline					Post-Intervention					dif
	N	%	M	SD	Range	N	%	M	SD	Range	
Age (years)	479		38.1	11.8	22-66	466		34.8	10.9	22 - 64	
Registered Nurse Years	479		9.9	11.3	0-45	461		8.5	10.0	0 - 41	
Role / Years in Role	479	100	7.1	8.8	0-43	464	100	6.6	8.2	0 - 41	
Staff Nurse Unit	417	87	6.8	8.8	0-43	421	90	6.4	8.1	0 - 41	
Staff Nurse Float Pool	19	4	10.6	8.1	0.5-26	16	3	10.8	9.5	0.5 - 33	
Manager	19	4	7.8	9.3	0.5-34	14	3	7.6	10.1	0.5 - 35	
CNS	12	3	11.7	8.6	4-32	10	2	9.2	9.9	0.3 - 33	
NC	6	1	2.5	1.1	0.75-4	5	2	3.1	1.5	1.5 – 4	
Other	6	1	5.7	8.7	0.5-21	1	0	0.5	0.5	0.5 – 0.5	
Female	430	90				419	90				

Nurse Survey – Sample/Population Details

Staff Nurse Characteristics	Baseline (n=436)		T1 Population N=947	Post-Intervention (n=437)		T2 Population N=968
	N	%		N	%	
Education						
ADN/Diploma	99	21 %		85	18%	
BSN	342	72 %	650 (68.6%)	339	73%	727 (75%)
MS or Higher	34	7 %	17 (1.8%)	43	8%	19 (2%)
Certification						
Yes	113	25%	110/567 (19.4%)	106	24%	99/556 (17.8%)
Shift Length						
12 hour only	215	45%		215	46%	
8 & 12 hour	111	23%		122	26%	
Role (Advancement Model)						
Competent			370 (39%)			374 (39%)
Accomplished			212 (22%)			195 (20%)
Proficient			123 (14%)			123 (13%)
Expert			199 (21%)			224 (23%)
Other			43 (5%)			52 (5%)

The Nurse Survey was completed after the Observations and Patient Surveys were completed. The Post Intervention sample contained 182 subjects that had participated at baseline. In-depth analysis was conducted to evaluate the matched sample and compare it to the entire sample.

It was noted that the subjects who scored the highest on the baseline test did not repeat and many of the "new" participants did not attend the training.

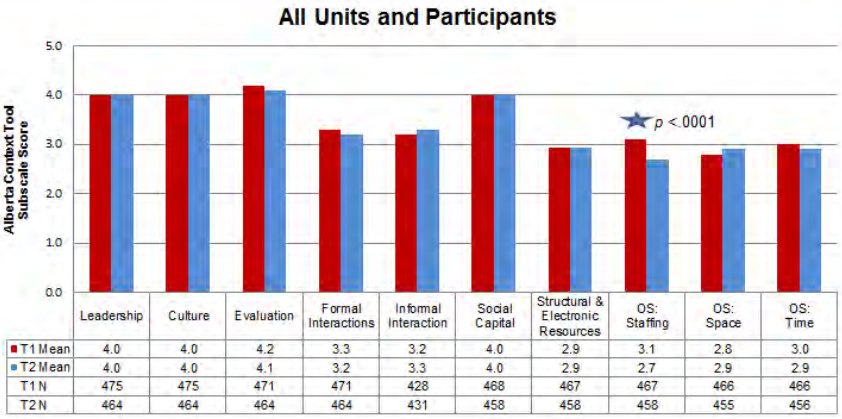
Participants were still more likely to be BSN and certified when compared with the sample of all nurses on the unit.

Unit Context

Characteristics	Baseline (n=479)		Post-Intervention (n=467)	
	N	%	N	%
Completed KBN Learning Modules				
Some modules (1-5)	173	36	205	44
All Epic modules (6-8)	194	41	161	34.5
None or Did not answer (0/missing)	112	23	101	21.5
Structural & Electronic Resource Use at Work* (last typical month) – Never/Rarely/NA				
Policies and procedures (SER 5)	57	12	38	1.8
Clinical Practice guidelines (SER 6)	72	15	74	16.2
Clinical decision-support (CDS) SER 8	205	44	196	42.8
Staffing - Disagree or Strongly Disagree				
Enough Staff for Necessary Work	141	30	211	46
Enough Staff to Deliver Quality Care	176	38	248	54

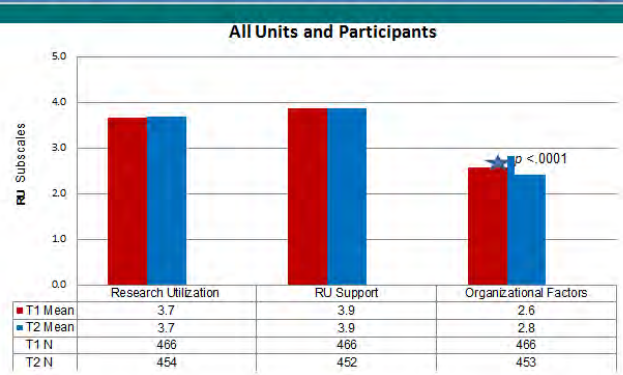
*Resources: Never to rare use of library (77%), textbooks (78%) or journals (58%)

Unit Context – T1 vs. T2



	Leadership	Culture	Evaluation	Formal Interactions	Informal Interaction	Social Capital	Structural & Electronic Resources	OS: Staffing	OS: Space	OS: Time
T1 Mean	4.0	4.0	4.2	3.3	3.2	4.0	2.9	3.1	2.8	3.0
T2 Mean	4.0	4.0	4.1	3.2	3.3	4.0	2.9	2.7	2.9	2.9
T1 N	475	475	471	471	428	468	467	467	466	466
T2 N	464	464	464	464	431	458	458	458	455	456

Research Utilization T1 v. T2



	Research Utilization	RU Support	Organizational Factors
T1 Mean	3.7	3.9	2.6
T2 Mean	3.7	3.9	2.8
T1 N	466	466	466
T2 N	454	452	453

The Context evaluation was reviewed – fewer post-survey participants had completed the training modules.

More reported using policy and procedures in their daily work.

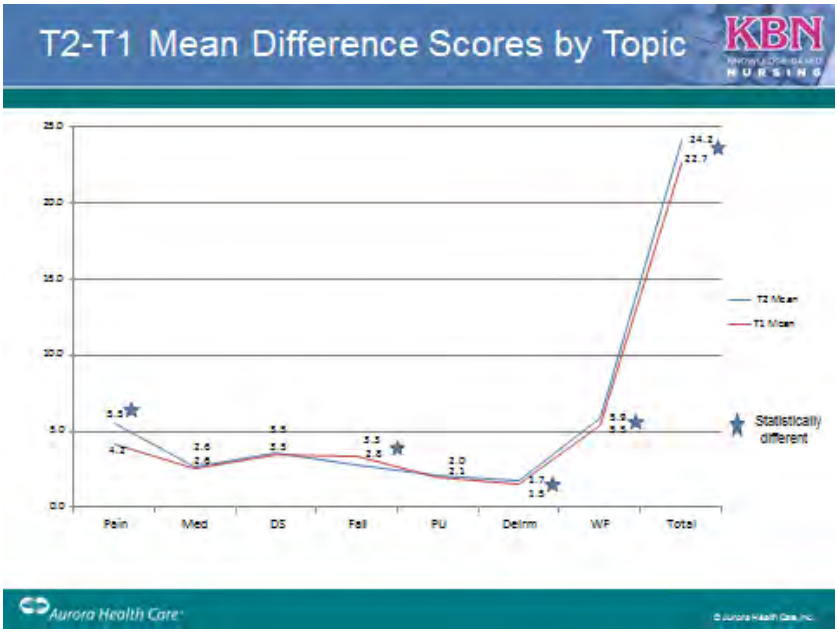
More (statistically significant) reported that staffing was not enough for work or to deliver quality care.

The Alberta Context Evaluation showed that the mean scores across most subscales continued to be rated above the midpoint.

The "Resource" and "Slack" variables however were below the midpoint with a drop in perceptions about Staffing – a subscale that was rated statistically lower for Leaders and Staff.

Perceptions about Research Utilization remained high, although participants reported a statistically significant reduction in the organizational supports for research between baseline and the post period.

Knowledge Test Results – Comparing Difference Scores



Knowledge Test scores improved significantly for Pain, Delirium, Workflow, and Total Score. The Scores went down re: Risk for Falls.

The Patient Volumes and Staffing Hours were unchanged, but the LOS for the time period when down significant by almost one day.

Outcome: T1 (Q2 2014) vs. T2 (Q2 2015)

KBN KNOWLEDGE-BASED NURSING

Metric (3 month average)	Baseline (Q2, 2014)				Post-Intervention (Q2, 2015)				Ttest
	N	M	SD	Range	N	M	SD	Range	(p)
Average Length of Stay^	23	4.68	1.1	3.0 - 6.8	23	3.86	0.6	2.6 – 5.0	0.003
Admissions/Month	23	108.7	26.7	56-160	23	99.3	22.0	46 – 130	0.20
30 Day Readmission Rate	23	0.17	0.06	0.09-0.31	23	0.18	0.07	0.06-0.38	0.55
Press Ganey Pain Management	23	0.83	0.1	0.69 –1.0	23	0.83	0.1	0.64 – 1.0	0.88
Press Ganey Patient Education	23	0.90	0.1	0.72 –1.0	23	0.89	0.1	0.77-1.0	0.65
NDNQI Fall Rate (#/1,000 PD)	23	2.04	2.0	0 – 6.5	23	2.04	1.3	0 – 4.0	0.99
NDNQI Injury Fall Rate (#/1000 PD)	23	0.60	0.8	0 – 2.6	23	0.42	0.4	0 –1.04	0.34
NDNQI+ Pressure Ulcers (#/1000 PD)	23	4.65	6.3	0 – 28	23	2.04	3.0	0 –9.5	0.08
NDNQI+ Stage II PU (#/1000 PD)	23	4.29	6.4	0 - 28	23	2.03	3.0	0 –9.5	0.14
KPI: Integumentary Assmnt w/in 4 hrs	23	0.93	0.2	0 – 100	23	0.98	0.01	0.96 – 1.0	0.22
KPI: Braden Assessment w/in 4 hrs	23	0.88	0.2	0 – 0.99	23	0.93	0.04	0.86 – 1.0	0.21
KPI: Morse Risk Assessment w/in 8hrs	23	0.91	0.2	0 – 1.0	23	0.98	0.02	0.9 – 1.0	0.17
KPI: Not Taking Meds Rate	23	0.04	0.1	0.01-0.32	23	0.06	0.1	0.01 – 0.37	0.53
KPI: Delirium Symptoms	23	0.07	0.04	0.02 – 0.16	23	0.06	0.06	0.01-0.26	0.89
KPI: Antipsychotic Med Admin#	23	0.04	0.2	0.02 – 0.1	23	0.06	0.02	0.03 -0.12	0.003

APPENDIX G: KBN Impact Study – Projected Timeline Year 3 with No Cost Extension thru 10/2016